

GUIDE INFORMATION FOR ELECTRICAL EQUIPMENT THE WHITE BOOK 2013

UL PRODUCT CATEGORIES CORRELATED TO THE
2008 AND 2011 *NATIONAL ELECTRICAL CODE®*

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Guide Information for Electrical Equipment THE WHITE BOOK

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Introduction

The White Book contains the General Guide Information for product categories in UL's Electrical Construction Equipment and Hazardous Locations Equipment Directories. In addition, General Guide Information for selected categories in UL's Electrical Appliance and Utilization Equipment Directory, Fire Protection Equipment Directory, Fire Resistance Directory, Building Materials Directory, Heating, Cooling, Ventilating and Cooking Equipment Directory, Mechanical Equipment and Associated Products Directory, Flammable and Combustible Liquids and Gases Equipment Directory and Plumbing and Associated Products Directory are also included in the White Book. Attention is directed specifically to the General Guide Information following the product category headings that describe limitations of the Listings, such as current, voltage and horsepower and installation provisions. The scope and sizes and ratings specified in the General Guide Information is intended to indicate the current range of Listings, and is not necessarily indicative of the limitations for Listing.

The White Book includes seven UL Marking Guides and two Application Guides. UL developed these Marking Guides to assist Authorities Having Jurisdiction (AHJs) and installers in understanding the meanings and locations of markings associated with switchboards, panelboards, circuit breakers, luminaires, swimming pools and spas, electrical heating and cooling equipment, wire and cable, alternative energy and lightning protection. UL developed the Application Guides to assist code and inspection authorities, electric utilities, contractors, installers, users, system designers, and other interested parties in understanding the basic components of alternative energy systems and lightning protection systems and the applicable codes and standards in order to facilitate a reasonably safe and code-compliant installation. See Appendix A.

The White Book does not contain the names of companies authorized to use the UL Mark, nor does it contain specific identification of products authorized to bear the UL Mark. Such information appears in UL's Electrical Construction Equipment Directory, Hazardous Locations Equipment Directory, Electrical Appliance and Utilization Equipment Directory, Fire Protection Equipment Directory, Fire Resistance Directory, Building Materials Directory, Heating, Cooling, Ventilating and Cooking Equipment Directory, Mechanical Equipment and Associated Products Directory, Flammable and Combustible Liquids and Gases Equipment Directory and Plumbing and Associated Products Directory.



Only those products bearing the appropriate UL Mark and the company's name, trade name, trademark or other authorized identification should be considered as being covered by UL's Listing or Classification and Follow-Up Service. The UL Mark provides evidence of listing or labeling, which may be required by installation codes or standards.

Many of the products bearing the UL Mark incorporate components that bear the UL Recognized Component Mark. The Recognized Component Mark  is applicable to components that are incomplete in construction features or limited in performance capabilities. **The Recognized Component Mark does not provide evidence of listing or labeling, which may be required by installation codes or standards.**

The White Book contains General Guide Information in effect as of January 21, 2013. Information on new or revised product categories established after the effective date will be found in UL's Online Certifications Directory at www.ul.com/database and will appear in the next annual White Book.

Look for the UL Mark

Identification of UL Listed and Classified Products

The symbol  and the name "Underwriters Laboratories Inc." in various forms and abbreviations are registered with the U.S. Patent and Trademark Office, and in numerous other countries. Subject to the terms of UL's Follow-Up Service Agreement, companies are permitted to use the symbol  or other specified forms of UL's name as part of the UL Mark on products that are Listed or Classified and that comply with UL's requirements.

The product name as indicated in the General Guide Information for each product category is generally included as part of the UL Mark, but may be omitted when, in UL's opinion, the use of the name is unnecessary and the UL Mark is directly and permanently applied to the product by stamping, molding, ink-stamping, silk screening or similar processes.

A separable UL Mark (not part of a nameplate and in the form of decals, stickers or labels) will always include the following four elements: UL's symbol (UL), the word "LISTED" or "CLASSIFIED," the product or category name, and a control number assigned by UL.

The complete UL Mark will appear on the product unless otherwise indicated in the General Guide Information for a specific product category.

When a UL Listed product is of such a size, shape, material or surface texture that, in UL's opinion, it is impossible to apply legibly the complete marking to the product, the complete UL Listing Mark will appear on the smallest unit container in which the product is packaged. In these cases UL may authorize the use of the UL symbol (UL) on the product in addition to the complete UL Mark on the package.

When a UL Classified product is of such a size, shape, material or surface texture that, in UL's opinion, it is impossible to apply legibly the complete marking to the product, the complete UL Classification Mark will appear on the smallest unit container in which the product is packaged. In these cases there shall be no reference to UL on the product.

Refer to the General Guide Information for each product category for additional information on the specific UL Mark for the products in the category.

UL Certification Services and Marks

Listing Service

UL's Listing Service is the most familiar form of UL's product safety certification programs. The UL Listing Mark on a product means that the manufacturer has demonstrated the ability to produce a product that complies with appropriate requirements regarding reasonably foreseeable risks associated with the product. The UL Listing Mark for Canada is applied to products for use in Canada that have been investigated to Canadian safety requirements. The UL Listing Mark for Canada and the U.S. is applied to products for use in the U.S. and Canada that have been investigated to the requirements of both countries. UL conducts Follow-Up Service as an audit of the means the manufacturer uses to determine continued compliance of the product with UL's requirements.



Classification Service

With UL's Classification Service, UL determines that a manufacturer has demonstrated the ability to produce a product that complies with its requirements for the purpose of classification or evaluation regarding one or more of the following: (1) specific risks only, such as casualty, fire or shock; (2) performance under specified conditions; (3) regulatory codes; (4) other standards, including international or regional standards; or (5) other conditions UL may consider desirable. UL conducts Follow-Up Service as an audit of the means the manufacturer uses to determine continued compliance of the product with UL's requirements.



UL's Classification Mark includes a qualifying statement designated by UL. A UL Classification Mark for Canada is used for products intended for the Canadian marketplace. It indicates that UL has used Canadian standards to investigate the product for specific hazards or properties. A UL Classification Mark

for Canada and the U.S. is used for products intended for the Canadian and U.S. marketplaces. This Mark indicates that UL has used the requirements of both countries to investigate the product for specific hazards or properties.

Component Recognition Service

Many UL investigations of equipment involve an evaluation of the suitability of components such as relays, thermostats, switches, etc. for specific applications. Where such components are designed to comply with all the construction and performance requirements of the category, they are eligible for UL Listing and suitable for either field or factory installation.

In some situations, components of special design may be incomplete in construction or restricted in performance capabilities and not Recognized for use as field-installed components. These components may be entirely suitable for factory installation on other equipment where the limitations of use are known to the manufacturer and where their use within such limitations may be investigated by UL.

With UL’s Component Recognition Service, UL determines that a manufacturer has demonstrated the ability to produce a component for use in an end product that complies with UL’s requirements. This type of investigation takes into account the performance and construction characteristics of the end product and how the component will be used in that product. UL conducts Follow-Up Service as an audit of the means the manufacturer uses to determine continued compliance of the component with UL’s requirements.



UL Recognized Component Mark



UL Recognized Component Mark for Canada and the United States

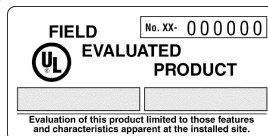


UL Recognized Component Mark for Canada

UL Recognized Components, or their packaging, are eligible to bear the UL Recognized Component Mark, the UL Recognized Component Mark for Canada, or the UL Recognized Component Mark for Canada and the U.S. **The Recognized Component Mark does not provide evidence of listing or labeling, which may be required by installation codes or standards.**

Field Evaluation Service

This service covers on-site safety evaluations of installed products or systems, conducted by UL technical staff. UL’s Field Evaluated Product Mark (below) can be applied to the product in the field if the product complies with UL’s safety requirements.



UL Field Evaluated Product Mark

Field Inspection Service

This service covers on-site safety inspections of products that were eligible to bear a UL Mark at the time of manufacture, but the UL Mark is not present on the product. A UL representative can perform an inspection and, if the product is determined to meet UL requirements, a UL Mark will be applied to the product.

INSTALLATION AND USE OF PRODUCTS BEARING THE UL MARK

Use of the White Book

The White Book includes the following:

- A compilation of all product categories applicable to an electrical inspector arranged alphabetically by category code
- General Guide Information for each product category that includes references to the requirements used for the investigation of the products and the UL Mark to be used on the product
 - Information relating to limitations or special conditions applying to the product
 - The titles and designations of standards or requirements that have been used for the investigation of products in a specific product category
- Index of UL Product Categories and Industry Terms
- Index of UL Product Categories Correlated to the 2011NEC®
- Index of UL Product Categories Correlated to the 2008NEC®
- UL Marking Guides
- UL Application Guides
- UL's Online Certifications Directory Quick Guide (to assist in finding General Guide Information and Listings online)

UL Listing and Classification information is arranged alphabetically in the White Book by product category code.

The four-letter code (shown in parentheses) following each category title is the product category code designation.

This information may include the identification of published standards that have been used to investigate products in that category. There may not be a published standard against which a product can be tested and evaluated to determine its acceptability for the UL Mark. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from standards and other sources and will develop requirements to cover uses and conditions for which specific requirements did not previously exist.

The scope of each UL Standard for Safety and Outline of Investigation can be accessed at <http://ulstandardsinfonet.ul.com>.

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Practical Application of the White Book in the Field

Using the White Book in the field to help identify the intended use of a Listed product to assist in determining compliance with Section 110.3(B) of ANSI/NFPA 70, “National Electrical Code” (*NEC*®), can be accomplished by at least two methods.

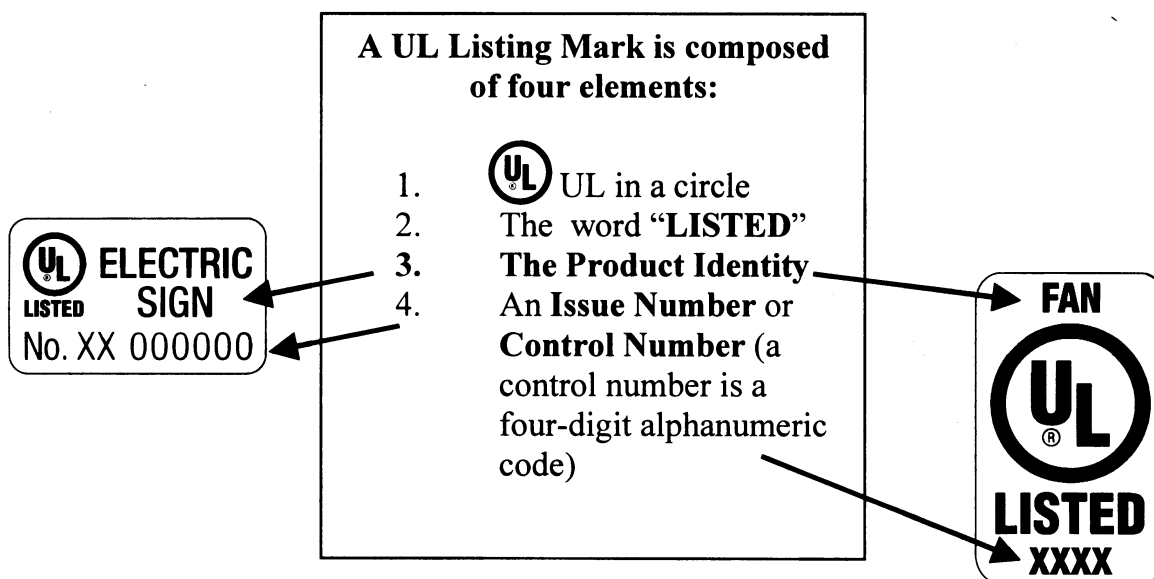
Method 1 —

If you know the Section in the 2011 or 2008 *NEC*® for which you are seeking to determine compliance, locate the **Index of UL Product Categories Correlated to the 2011 or 2008 *NEC*®** in the back of the White Book on page 501 for the 2011 or page 547 for the 2008 and search for the Code Section in question. The index may identify product categories applicable to the *NEC*® Section referenced if specific product categories exist for that Code Section. This index is a guide only and there may be other product categories for which Listed products are covered that may be applicable to the Code Section.

Method 2 —

This is a three-step process detailed below:

Step 1 - Determine the Product Identity from the UL Listing Mark.



Step 2 - Locate the Product Identity in the Index of UL Product Categories and Industry Terms located in the back of the White Book in Appendix C.

Once you have located the product identity, use the **Index of UL Product Categories and Industry Terms** in the back of the White Book in Appendix C to find the product category. The index will identify the product category and the page number for the product category Guide Information.

INDEX OF PRODUCT CATEGORIES				275	
	Page		Page	Page	
Optical Fiber Cable Verified in Accordance with National or International Specifications (QAZI)	86	Power Outlets and Power Outlet Fittings (QPYV)	101	Shipboard Cable, Marine Classified in Accordance with International Specifications (UBWK)	114
Optical Fiber Cable Verified in Accordance with New York City Transit Specification TO (QAZK)	86	Power Supplies (QQAQ)	101	Signs (UXYT)	114
Optical Fiber/Communications/Signaling/Coaxial Cable Raceways (QAZM)	86	Power Supplies, Gas Tube Sign (QQDZ) ..	102	Field Installed Neon Outline Lighting Systems (UYAM)	115
Optical Fiber Raceway Assemblies (QAZQ)	87	Power Supplies, General Purpose (QQFU)	102	Signs, Changing Message (UYFS)	115
Optical Fiber/Communications Cable Routing Assemblies for Use in Telecommunication Installations (QBAA) ..	87	Power Supplies, Information Technology Equipment Including Electrical Business Equipment (QQGQ)	102	Sign Accessories (UYMR)	116
		Power Supplies, Specialty (QQJJ)	102	Sign Components Classified for Use with Specified Equipment (UYTA)	116
		Power Supplies, Telephone (QQJE)	103	Sign Controllers, Message Centers (UYTQ)	116
		Power Supplies, Gas Tube Sign (QQQK)	103		

Step 3 - Access the product category Guide Information page identified in the Index of UL Product Categories and Industry Terms.

Once you locate the page, you will be able to find the Guide Information for the product category, in this case Signs (UXYT). See the Guide Information for Signs (UXYT) below.

Guide Information for Signs (UXYT)

Anatomy of UL Guide Information

- **Product Category Title**
- **Product Category Code**
(This four-letter alpha code that appears in parentheses is assigned to each specific product category for cataloging in UL's directories. The product categories in the White Book as well as all UL directories are organized alphabetically by this code. Category Codes are not acronyms; they are created and assigned by mathematic process.)
- **General Information** relating to intended use and installation, scope of certification, product markings and requirements used for investigating the product.
- **UL Mark**
The last paragraph of all Guide Information explains how to identify products covered under the product category. **The UL Mark on the product is the only way to identify a Listed product. Always consult this section of the Guide Information to identify the UL Mark requirements for the product.**

SIGNS (UXYT)

USE AND INSTALLATION

This category covers electric signs employing incandescent lamps, LEDs (light emitting diodes), electro-luminescent panels, neon tubing, fluorescent lamps, high intensity discharge lamps or combinations thereof for installation in accordance with Article 600 of NFPA 70, "National Electrical Code."

Cord and plug-connected signs do not have provision for permanent mounting to a building or structure. Due to servicing considerations, specific types of cord and plug-connected signs are intended and have provision for installation on end-use equipment.

Signs or sections of a sign forming a complete enclosure intended for permanent connection to a source of supply are provided with permanent means for attachment to a building, to a support or to a hanging rig. The mounting hardware, poles and other structural components of a sign have not been evaluated with respect to local variable conditions such as local wind and snow loading or soil conditions.

Electric signs, of such size that shipment in one carton or fully assembled is impractical, may be divided into sections. Each major sub-assembly bears an "Electric Sign Section" Listing Mark. Sign faces, trim and mounting hardware are not considered major subassemblies. Each sign has installation instructions describing or illustrating the proper assembly, mounting and connection of the sign sections. The acceptability of the assembled sections in the field rests with the Authority Having Jurisdiction.

PRODUCT MARKINGS

Signs intended for permanent installation and which have been investigated for indoor use only are so marked. Cord-connected signs investigated for outdoor use are marked "Outdoor." Signs for outline lighting are marked "Outdoor Sign for Outline Lighting."

Signs, sign sections or outline lighting marked "The neon supply(ies) complies(y) with the secondary ground-fault protection requirements of UL 2161" are provided with neon transformers and power supplies that comply with the secondary fault protection requirements specified in UL 2161, "Neon Transformers and Power Supplies."

REBUILT PRODUCTS

This category also covers signs that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt signs are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt signs are subject to the same requirements as new signs.

RELATED PRODUCTS

Accessories intended for use in Listed signs are covered under Sign Accessories (UYMR).

Retrofit conversions intended to be field installed in Listed electric signs are covered under Sign Conversions, Retrofit (UYWU).

Changing message center signs may contain integral controllers or may be intended for use with externally connected controllers. Externally connected controllers are covered under Sign Controllers, Message Centers (UYTQ).

This category does not cover billboard illumination, exit lights, skeletal neon tubing for show windows, or illuminated clocks rated 600 V or less.

Field-assembled neon systems used in display windows, outline lighting, or skeletal neon signs are covered under Skeletal Neon Sign and Outline Lighting Systems, Field Assembled (UZBL).

Field-assembled cold cathode electric discharge lighting systems that provide general illumination are covered under Electric Discharge Lighting Systems, Cold Cathode (IFAY).

Field-installed neon outline lighting systems that outline or call attention to architectural details of a room or building are covered under Field Installed Neon Outline Lighting Systems (UYAM).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 48, "Electric Signs."

Electric signs that comply with the requirements in UL 153, "Portable Electric Lamps" may also be Listed as Portable Lamps (QOWZ) in the Electrical Appliance and Utilization Equipment Directory.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Indoor Electric Sign," "Electric Sign" or "Electric Sign Section." For rebuilt signs the word "Rebuilt" precedes the product name.

Field Modifications

What happens to the Listing if a UL-Listed product is modified in the field?

An authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements when it was shipped from the factory. When a UL-Listed product is modified after it leaves the factory, UL has no way to determine if the product continues to comply with the safety requirements used to certify the product without investigating the modified product. UL can neither indicate that such modifications "void" the UL Mark, nor that the product continues to meet UL's safety requirements, unless the field modifications have been specifically investigated by UL. It is the responsibility of the Authority Having Jurisdiction (AHJ) to determine the acceptability of the modification or if the modifications are significant enough to require one of UL's Field Engineering Services staff members to evaluate the modified product. UL can assist the AHJ in making this determination.

An exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the marking on the product have been investigated for use in that product.

If a party wishes UL to determine if the modifications made to a UL Listed product comply with UL requirements, the appropriate Field Engineering Service can be initiated to investigate the modifications. This investigation will only be conducted after UL consults with the AHJ to ensure that UL's investigation addresses all areas of concern and meets all of the AHJ's needs.

If you have any questions or would like to inquire about a Field Evaluation, contact Field Services at +1-877-UL-HELPS, prompt #2 (+1-877-854-3577) or visit <http://www.ul.com/field/>.

Field Labeling

Is it permissible to apply a UL Mark in the field?

The application of a UL Mark in the field is only permitted when an inspection is conducted under one of UL's Field Engineering Services in the presence of a UL representative.

CE Marking Information

A CE Marking is a European marking of conformity that indicates that a product complies with the essential requirements of the applicable European laws or Directives with respect to safety, health, environment and consumer protection. Generally, this conformity to the applicable directives is done through self-declaration. The CE Marking is required on products in the countries of the European Economic Area (EEA) to facilitate trade between the member countries. The manufacturer or his authorized representative established in the EEA is responsible for affixing the CE Marking to his product. The CE Marking provides a means for a manufacturer to demonstrate that his product complies with a common set of laws required by all of the countries in the EEA to allow free movement of trade within the EEA countries.



Unlike the UL Mark, the CE Marking:

- Is not a safety certification mark,
- Is generally based on self-declaration rather than third-party certification, and
- Does not demonstrate compliance to North American safety standards or installation codes.

A product that bears a CE Marking may also bear a certification mark, such as UL's Listing Mark; however, the CE Marking and the UL Mark have no association. The UL Mark indicates compliance with the applicable safety requirements in effect in North America and is evidence of UL certification, which is accepted by model North American installation codes, such as the *National Electrical Code*® and the *Canadian Electrical Code*®.

The CE Marking on products is not a certification mark. AHJs should continue to look for the UL Mark on products in order to determine if a product complies with applicable safety requirements for North America.

BUILDING MATERIALS (AABM)

GENERAL

Building materials include adhesives, coatings, acoustical materials and the like, investigated for surface burning characteristics, such as flame spread and smoke developed during fire exposure. Other building materials include prefabricated buildings, structural building products, gypsum board, fireplaces and chimneys, elevator equipment, and exiting equipment, such as exit signs, exit appliances, and emergency lighting and power equipment.

INVESTIGATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association (NFPA), and applicable model codes identified in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are investigated for the specifications or use conditions indicated in the general Guide Information for each product category.

These products are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FIRE PROTECTION EQUIPMENT (AAFP)

GENERAL

Fire protection equipment includes fire suppression equipment and systems, fire alarm equipment and fire fighting equipment, such as fire hoses, fire and emergency services protective clothing, and automotive fire apparatus. Also included are furnishings in buildings investigated for combustibility, such as upholstered furniture, mattresses, and warehouse pallets.

This equipment is intended for use only as described in the general Guide Information for each product category and individual Listings. This equipment has been investigated for use as described in the instructions and markings provided with the equipment. The use of the equipment in conditions other than described in the instructions, markings and the general Guide Information for the applicable product category has not been investigated by UL.

CERTIFICATE SERVICE

Fire alarm systems require extensive installation work and maintenance by the Listed installing company. UL's Standards for these systems cover installation methods, extent of protection, and maintenance service, which are supervised under UL's Certificate Service.

Under Certificate Service, UL authorizes the issuance of UL's certificates to installations which the Listed installing company represents to be in compliance with requirements established for the product category. The certificate indicates the classification, extent, location of equipment, period covered by the certificate, and name of the installing company.

UL conducts countercheck field examinations of representative installations of the Listed installing company. UL assumes no liability for any loss that may result from failure of the equipment, incorrect certification or nonconformity with requirements. If installations not in compliance with UL's requirements are found as a result of field examinations, they are subject to correction by the Listed installing company or cancellation of the certificate.

All of a company's alarm system installations may not be covered under UL's Certificate Service. Only those installations for which a certificate has been properly issued are covered under UL's Certificate Service.

UL maintains a Certificate Verification Service (ULCVS) that allows Authorities Having Jurisdiction (AHJs) to verify up-to-date Certificate information and identify companies eligible to issue Certificates as of the date of the inquiry. Only those alarm or signal system installations for which a Certificate has been issued are covered under UL's Certificate Service. The verification of a Certificate on ULCVS is the only method UL provides to identify the Certified alarm systems actively covered under its Listing and Follow-Up Service.

INVESTIGATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association, and applicable model codes identified in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are investigated for the specifications or use conditions indicated in the general Guide Information for each product category.

These products are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

INDOOR AND OUTDOOR USE

Unless outdoor use is specifically indicated in the general Guide Information for the product category or included in the individual Listings of the product, individual appliances have been investigated only for use indoors, unless the product, by its inherent nature, is obviously intended for use outdoors.

ELECTRICAL INSTALLATIONS

General — The ampere or wattage marking on electrical power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to electric heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Supply Conductors — Except as noted in the general Guide Information for some product categories, most terminals are for use only with copper wire unless marked otherwise. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted below or in the general Guide Information for certain product categories, the electrical termination provisions on equipment are based on the use of 60°C insulated conductors in circuits rated 100 A or less and the use of 75°C insulated conductors in higher rated circuits.

If the electrical termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75 or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) specified in Table 310.16 of ANSI/NFPA 70, "National Electrical Code" (NEC), should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

Terminations — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Supply terminals of 15 A and 20 A switches and receptacles not marked "CO/ALR" are for use with copper and copper-clad aluminum conductors only. Terminals marked "CO/ALR" are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked "AL/CU" are for use with copper conductors only. Terminals of switches rated 30 A and above marked "AL/CU" are for use with aluminum, copper and copper-clad aluminum conductors.

Combination of dissimilar conductors in terminal or splicing connectors is acceptable only in dry locations and when the connectors are identified as suitable for such intermixing.

Hazardous Locations — Electrical equipment and appliances are not intended for use in hazardous (classified) locations, as defined in the NEC, unless specifically identified as suitable for use in hazardous locations.

UL, in performing its functions in accordance with its objectives, does not assume or undertake any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HEATING, COOLING, VENTILATING AND COOKING EQUIPMENT (AAHC)

GENERAL

This equipment is intended for heating, cooling, refrigerating, ventilating and cooking, and uses various energy sources including electricity, gas, petroleum-base liquid, solid fuel or solar energy.

Fuel-fired equipment is intended for use only with the fuels described in the general Guide Information for each product category and individual Listings. This equipment has been investigated for use as described in the instructions and markings provided with the equipment. The use of the equipment with other fuels, and in conditions other than described in the instructions, markings and the general Guide Information for the applicable product category, has not been investigated by UL.

INVESTIGATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association (NFPA), and applicable model codes identified in the general Guide Information for each product category.

In addition, certain products have been investigated with reference to environmental and public health effects and for potential conformity to the installation and use provisions of applicable environmental and public health requirements, if so indicated in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are investigated for the specifications or use conditions indicated in the general Guide Information for each product category.

These products are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

INDOOR AND OUTDOOR USE

HEATING, COOLING, VENTILATING AND COOKING
EQUIPMENT (AAHC)

Unless outdoor use is specifically indicated in the general Guide Information for the product category or included in the individual Listings of the product, individual appliances have been investigated only for use indoors, unless the product, by its inherent nature, is obviously intended for use outdoors.

ELECTRICAL INSTALLATIONS

General — The ampere or wattage marking on electrical power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to electric heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Supply Conductors — Except as noted in the general Guide Information for some product categories, most terminals are for use only with copper wire unless marked otherwise. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted below or in the general Guide Information for certain product categories, the electrical termination provisions on equipment are based on the use of 60°C insulated conductors in circuits rated 100 A or less and the use of 75°C insulated conductors in higher rated circuits.

If the electrical termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75 or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) specified in Table 310.16 of ANSI/NFPA 70, "National Electrical Code" (NEC), should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

Terminations — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Supply terminals of 15 A and 20 A switches and receptacles not marked "CO/ALR" are for use with copper and copper-clad aluminum conductors only. Terminals marked "CO/ALR" are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked "AL/CU" are for use with copper conductors only. Terminals of switches rated 30 A and above marked "AL/CU" are for use with aluminum, copper and copper-clad aluminum conductors.

Combination of dissimilar conductors in terminal or splicing connectors is acceptable only in dry locations and when the connectors are identified as suitable for such intermixing.

Hazardous Locations — Electrical equipment and appliances are not intended for use in hazardous (classified) locations, as defined in the NEC, unless specifically identified as suitable for use in hazardous locations.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EQUIPMENT FOR USE IN AND RELATING TO CLASS I, II AND III, DIVISION 1 AND 2 HAZARDOUS LOCATIONS (AAIZ)

GENERAL

Electrical equipment for use in and relating to Class I, II and III, Division 1 and 2 hazardous (classified) locations has been investigated with reference to risk to life and property and for potential conformity to the installation and use provisions of ANSI/NFPA 70, "National Electrical

EQUIPMENT FOR USE IN AND RELATING TO CLASS I, II AND
III, DIVISION 1 AND 2 HAZARDOUS LOCATIONS (AAIZ)

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Code" (NEC), or United States Coast Guard (USCG) Electrical Engineering Regulations 46CFR110, "General Provisions," 46CFR111, "Electric Systems – General Requirements," 46CFR112, "Emergency Lighting and Power Systems," and 46CFR113, "Communication and Alarm Systems and Equipment." Those products investigated for conformity to the installation and use provisions of the USCG Regulations are identified in the general Guide Information for each product category or the individual Listings for the product. Attention is called to the limitations of the individual Listings and Classifications specified in the general Guide Information for each product category, such as current, voltage, horsepower limits, markings, special descriptions and installation provisions.

Unless equipment is identified in 1) the product category title as relating to hazardous (classified) locations or 2) the individual Listings as apparatus for use in unclassified locations, all product categories contain electrical equipment for use in Class I, II and III hazardous (classified) locations.

Regarding electrical equipment for use in and relating to Zone classified locations, some general technical information is provided together with the specific technical information provided regarding Division classified locations. For additional specific technical information regarding Zone classified locations, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

Electrical equipment for use in and relating to hazardous (classified) locations must also comply with the applicable requirements for the same type of equipment for use in unclassified locations. For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**HAZARDOUS (CLASSIFIED) LOCATIONS — GENERAL
INFORMATION**

Hazardous (classified) locations, as defined in the NEC, are locations where fire or explosion hazards may exist due to the presence of flammable gases, vapors or flammable liquids, combustible dusts, or ignitable fibers or flyings.

There are two independent classification systems. One system, found in Article 500 of the NEC, divides all hazardous (classified) locations into Classes, Divisions and Groups. A Division 1 location is a location where an ignitable concentration of a flammable or combustible material is present under normal operating conditions. A Division 2 location is a location where an ignitable concentration of a flammable or combustible material is present only under abnormal operating conditions.

The other classification system is found in Articles 505 and 506 of the NEC:

Article 505 divides locations having gases and vapors into Class I, Zones and Gas Groups. A Zone 0 location is a location where ignitable concentrations are present continuously or for long period of time. A Zone 1 location is a location where ignitable concentrations are likely to exist under normal operating conditions. A Zone 2 location is a location where ignitable concentrations are not likely to occur in normal operation and, if they do occur, will only persist for a short period.

Article 506 divides locations having dusts, fibers or flyings into Zones. A Zone 20 location is a location where ignitable concentrations are present continuously or for long periods of time. A Zone 21 location is a location where ignitable concentrations are likely to exist under normal operating conditions. A Zone 22 location is a location where ignitable concentrations are not likely to occur in normal operation and, if they do occur, will only persist for a short period.

Protection against explosion in hazardous (classified) locations requires that all equipment that could be exposed to the flammable or combustible atmospheres be of a type suitable for installation in such locations. The Classes and Groups for which equipment has been Listed or Classified are shown in the individual Listings and Classifications under the respective categories and are marked on the equipment itself. In addition, intrinsically safe circuit-wiring terminals and intrinsically safe equipment is marked "Intrinsically Safe."

Gas, Vapor and Dust Groups

The following paragraphs group flammable and explosive mixtures of specific gases, vapors and dusts in accordance with the NEC classifications noted in Article 500. For a complete list of group classifications for Class I and II materials where used within Divisions 1 or 2, see ANSI/NFPA 497, "Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas," and ANSI/NFPA 499, "Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas."

Class I Equipment

Equipment for use in Class I hazardous (classified) locations, as defined in the NEC, is tested with respect to acceptability of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. For purposes of location classification for Divisions 1 and 2, such mixtures have been grouped on the basis of their characteristics as follows:

Class I, Group A — Atmospheres containing acetylene.

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AND III, DIVISION 1 AND 2 HAZARDOUS LOCATIONS (AAIZ)

Class I, Group B — Atmospheres containing gases or vapors having either a maximum experimental safe gap (MESG) less than or equal to 0.45 mm or a minimum igniting current ratio (MIC ratio) less than or equal to 0.40. Examples of Group B materials are acrolein, butadiene, ethylene oxide, propylene oxide, hydrogen, and fuel and combustible process gases containing more than 30% hydrogen by volume.

Class I, Group C — Atmospheres containing gases or vapors having either a maximum experimental safe gap (MESG) greater than 0.45 mm and less than or equal to 0.75 mm, or a minimum igniting current ratio (MIC ratio) greater than 0.40 and less than or equal to 0.80. Examples of Group C materials are ethyl ether and ethylene.

Class I, Group D — Atmospheres containing gases or vapors having either a maximum experimental safe gap (MESG) greater than 0.75 mm or a minimum igniting current ratio (MIC ratio) greater than 0.80. Examples of Group D materials are acetone, ammonia, benzene, butane, cyclopropane, ethanol, gasoline, hexane, methane, methanol, naphtha and propane.

Equipment for use in Class I, Zone 0, 1 and 2 hazardous (classified) locations, as defined in Article 505 of the NEC, is tested with respect to acceptability of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. For purposes of location classification, such mixtures have been grouped on the basis of their characteristics as follows:

Class I, Group IIC — Atmospheres containing hydrogen, acetylene, or gases or vapors having either a maximum experimental safe gap (MESG) less than or equal to 0.50 mm or a minimum igniting current ratio (MIC ratio) less than or equal to 0.45.

Class I, Group IIB — Atmospheres containing acetaldehyde, ethylene, or gases or vapors having either a maximum experimental safe gap (MESG) greater than 0.50 mm and less than or equal to 0.90 mm, or a minimum igniting current ratio (MIC ratio) greater than 0.45 and less than or equal to 0.80.

Class I, Group IIA — Atmospheres containing acetone, ammonia, ethyl alcohol, gasoline, methane, propane, or gases or vapors having either a maximum experimental safe gap (MESG) greater than 0.90 mm or a minimum igniting current ratio (MIC ratio) greater than 0.80.

The following table compares Class I, Division 1 and 2 Gas Groups with Class I, Zone 0, 1 and 2 Gas Groups. The gases shown are representative of others in the Group.

Division 1 and 2	Zone 0, 1 and 2
A (acetylene)	IIC (acetylene and hydrogen)
B (hydrogen)	IIC (acetylene and hydrogen)
C (ethylene)	IIB (ethylene)
D (propane)	IIA (propane)

Class I Equipment in Class II and III Locations

Equipment Listed or Classified for use in Class I locations is not necessarily acceptable for Class II or III locations as it may not be dust-tight or operate at a safe temperature when blanketed with dust, fibers or flyings.

Class II Equipment

Equipment for use in Class II hazardous (classified) locations, as defined in the NEC, is tested with respect to acceptability of operation in the presence of combustible dusts in air. For purposes of location classification, the NEC groups combustible dust-air mixtures as follows:

Class II, Group E — Atmospheres containing combustible metal dusts, including aluminum, magnesium, and their commercial alloys, or other combustible dusts whose particle size, abrasiveness, and conductivity present an equivalent hazard.

Class II, Group F — Atmospheres containing carbon black, charcoal, coal or coke dusts which have more than 8% total volatile material, or atmospheres containing these dusts sensitized by other materials so that they present an explosion hazard.

Class II, Group G — Atmospheres containing combustible dusts not included in Group E or F, including flour, grain, wood, plastic and chemicals.

There are no dust groups for Zone 20, 21 or 22. In addition, Article 506 of the NEC does not cover locations where metal dusts are present.

Class II Equipment in Class III Locations

Equipment Listed or Classified for Class II, Group G hazardous (classified) locations is also suitable for use in Class III locations, except for 1) those products marked for Division 2 only, and 2) fan-cooled-type motors where there is a very large amount of lint or combustible flyings that are likely to choke or clog the air passages of the motor.

Class III Equipment

Equipment for use in Class III hazardous (classified) locations, as defined in the NEC, is tested with respect to acceptability of operation in the presence of easily ignitable fibers or flyings. These fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

There are no groups for fibers and flyings for Class III or for Zone 20, 21 or 22.

Intrinsically Safe Circuits and Apparatus, and Associated Apparatus

Intrinsically safe circuits and apparatus may be investigated for any or all of the Classes and Groups as defined in the NEC. In an intrinsically safe

EQUIPMENT FOR USE IN AND RELATING TO CLASS I, II AND
III, DIVISION 1 AND 2 HAZARDOUS LOCATIONS (AAIZ)

circuit, the energy level available in the hazardous (classified) location under normal and abnormal conditions is sufficiently low as not to cause ignition of the specified explosive atmospheres. It is important that intrinsically safe apparatus for locations containing metal dusts be constructed to exclude dust in order maintain the energy limitations by minimizing the possibility of circuit faults. To maintain the low energy levels, it is necessary that the intrinsically safe and associated apparatus be installed and interconnected in accordance with Article 504 of the NEC and the instructions provided with the equipment.

Associated apparatus is apparatus in which the circuits are not necessarily intrinsically safe, but which affect the energy in the intrinsically safe circuits and are relied upon to maintain intrinsic safety. Associated apparatus is not intended for use in hazardous (classified) locations unless use in hazardous (classified) locations is specifically indicated.

When interconnecting associated apparatus with equipment for use in the hazardous (classified) location, special attention should be paid to installation instructions, control drawings, or product markings which may limit the types of connections that are acceptable.

Equipment Relating to Hazardous (Classified) Locations

Equipment relating to hazardous (classified) locations includes 1) devices, products and materials for use in locations where it is necessary for safety to avoid the accumulation of static electricity on personnel or equipment, 2) anesthesia equipment, 3) devices not intended for operation in hazardous (classified) locations, but which are designed to indicate certain potentially dangerous conditions with respect to such locations, 4) electrical equipment not intended for installation in hazardous (classified) locations except for provision of certain intrinsically safe (low energy) circuit extensions as indicated in the individual Listings and Classifications, and 5) paint spray booths.

Suitability of Listed or Classified Equipment

Equipment intended for use in a hazardous (classified) location Class and Group and marked "Division 1" (or "Div. 1") or without any Division indication is suitable for use in both Division 1 and 2 locations as defined in the NEC, and in unclassified locations. Equipment marked "Division 2" (or "Div. 2") is suitable only for Division 2 and unclassified locations.

The NEC also permits the following:

- Intrinsically safe equipment for Class I, Division 1 locations to be used in a Class I, Zone 0, 1 or 2 location of the same gas and with a suitable temperature class.
- Equipment (other than intrinsically safe equipment) for Class I, Division 1 locations to be used in a Class I, Zone 1 or 2 location of the same gas and with a suitable temperature class.
- Equipment for Class I, Division 2 locations to be used in a Class I, Zone 2 location of the same gas and with a suitable temperature class.
- Equipment for Class I, Zone 0 locations to be used in a Class I, Division 1 or 2 location of the same gas and with a suitable temperature class.
- Equipment for Class I, Zone 0, 1 or 2 locations to be used in a Class I, Division 2 location of the same gas and with a suitable temperature class.
- Equipment for Class II, Division 1 locations to be used in a Zone 20, 21 or 22 location with a suitable temperature class.
- Equipment for Class II, Division 2 locations to be used in a Zone 22 location with a suitable temperature class.
- Equipment for Zone 20 locations to be used in a Class II, Division 1 location of the same dust and with a suitable temperature class.
- Equipment for Zone 20, 21 or 22 locations to be used in a Class II, Division 2 location of the same dust and with a suitable temperature class.
- Equipment for Zone 20 locations with a temperature class of not greater than T120C for equipment subject to overloading or not greater than T165C for equipment not subject to overloading to be used in a Class III, Division 1 location.
- Equipment for Zone 20, 21 or 22 locations with a temperature class of not greater than T120C for equipment subject to overloading or not greater than T165C for equipment not subject to overloading to be used in a Class III, Division 2 location.

In addition, equipment for use in hazardous (classified) locations is also suitable for use in unclassified locations.

RELATED EQUIPMENT

For additional information on electrical equipment for use in and relating to Zone classified locations, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

For additional information on electrical equipment for use in unclassified locations, see Electrical Equipment for Use in Ordinary Locations (AALZ).

TEMPERATURE CONSIDERATIONS

The marked temperature class (T-code) of the equipment is based on either the maximum external temperature or internal temperature of the equipment, depending on the protection technique used.

EQUIPMENT FOR USE IN AND RELATING TO CLASS I, II AND III, DIVISION 1 AND 2 HAZARDOUS LOCATIONS (AAIZ)

Equipment is required to be marked with the operating temperature or temperature class (T-code) if the maximum operating temperature is more than 100°C (212°F). The marking specifies the temperature class or operating temperature based on a +40°C (+104°F) ambient temperature, or based on the higher ambient temperature if the equipment is rated and marked for an ambient temperature of greater than +40°C (+104°F). For equipment rated and marked for an upper ambient temperature of less than +40°C (+104°F), the operating temperature or temperature class is still based on +40°C (+104°F).

For Class I and II locations, this temperature marking should not exceed the ignition temperature of the specific combustible material to be encountered. For organic dusts that may dehydrate or carbonize, the temperature marking should not exceed the lower of either the ignition temperature or 165°C.

For Class III locations, the maximum permitted temperature is 120°C for equipment that is subject to overloading (such as motors) and 165°C for equipment that is not subject to overloading.

AMBIENT TEMPERATURES

Unless the equipment is marked otherwise, it has been investigated only for use under normal atmospheric conditions in an ambient temperature within the range of -25°C (-13°F) to +40°C (+104°F). Equipment may be investigated and marked for a lower ambient temperature that is greater than -25°C (-13°F). While equipment may be marked for an upper ambient temperature that is less +40°C (+104°F), equipment is always investigated for an upper ambient temperature of at least +40°C (+104°F).

Use of equipment under conditions of higher than normal atmospheric pressure or oxygen partial pressure, use in artificial atmospheres, and use under conditions of excessively high ambient temperatures can increase the likelihood of ignition of flammable atmospheres. In addition, low ambient temperatures may increase explosion pressures developed within explosion-proof equipment.

ENCLOSURE MODIFICATION AND MAINTENANCE

The integrity of an enclosure for explosion-proof or dust-ignition-proof equipment must be maintained. Making holes (other than conduit openings specified in the instructions) or alterations in the enclosure during installation may compromise the ability of the enclosure to contain the explosion or to exclude dust. Holding bolts and threaded parts must be screwed tight. The continued acceptability of the equipment will depend upon proper maintenance.

ENVIRONMENTAL CONSIDERATIONS

Unless the equipment is marked otherwise, it is intended to be used indoors where severe corrosive conditions are not likely to be present. Equipment investigated for severe environmental conditions is marked with an enclosure type designation or other designation indicating the suitability of the equipment in different environments. See ENCLOSURE CONSIDERATIONS FOR ALL EQUIPMENT below for more information.

ENCLOSURE CONSIDERATIONS FOR ALL EQUIPMENT

Section 110.11 of the NEC directs that equipment shall not be used in damp or wet locations; locations where exposed to gases, fumes, vapors, liquids or other agents having a deteriorating effect on the equipment; or locations where exposed to excessive temperatures unless the equipment is identified for use in such environments. Section 300.6 of the NEC provides guidance regarding protection against corrosion. To assist Authorities Having Jurisdiction, electrical equipment Listed or Classified for use in and relating to hazardous (classified) locations may be investigated for use in certain operating environments and marked with an enclosure type number or numbers. The following table summarizes the intended uses of the various enclosure types.

Provides a Degree of Protection Against the Following Environmental Conditions:	Type of Enclosure																
	1	2	3	3R	3S	3X	3RX	3SX	4	4X	5	6	6P	12	12K	13	
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Falling dirt	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dripping and light splashing of noncorrosive liquids	—	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Rain, snow and sleet	—	—	X	X	X	X	X	X	X	X	—	X	X	—	—	—	—

EQUIPMENT FOR USE IN AND RELATING TO CLASS I, II AND III, DIVISION 1 AND 2 HAZARDOUS LOCATIONS (AAIZ)

Provides a Degree of Protection Against the Following Environmental Conditions:	Type of Enclosure																
	1	2	3	3R	3S	3X	3RX	3SX	4	4X	5	6	6P	12	12K	13	
Rain, snow and sleet (external mechanism shall be operable when ice covered)	—	—	—	—	X	—	—	X	—	—	—	—	—	—	—	—	—
Circulating dust, lint, fibers and flyings	—	—	X	—	X	X	—	X	X	X	—	X	X	X	X	X	X
Settling airborne dust, lint, fibers and flyings	—	—	X	—	X	X	—	X	X	X	X	X	X	X	X	X	X
Windblown dust	—	—	X	—	X	X	—	X	X	X	—	X	X	—	—	—	—
Hosedown and splashing water	—	—	—	—	—	—	—	—	X	X	—	X	X	—	—	—	—
Oil and coolant seepage	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	X	X
Oil or coolant spraying and splashing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Corrosive agents	—	—	—	—	—	—	X	X	X	—	X	—	—	X	—	—	—
Occasional temporary submersion	—	—	—	—	—	—	—	—	—	—	—	—	X	X	—	—	—
Occasional prolonged submersion	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—

PRODUCT CATEGORIES BY CATEGORY CODE

In addition to the above enclosure types that provide a degree of protection against environmental conditions other than explosive atmospheres, there are two additional enclosure-type numbers: 7 (Class I, Division 1, Groups A, B, C and D involving air-break equipment) and 9 (Class II, Division 1, Groups E, F and G involving air-break equipment). These two additional enclosure types provide a degree of protection against explosive atmospheres. The marking of enclosure-type numbers 7 and 9 is optional, as the marking of Class and Group is required. The marking of Division 1 is optional for equipment suitable for Divisions 1 and 2.

Enclosures for indoor locations include Types 1, 2, 5, 7, 9, 12, 12K and 13; enclosures for indoor or outdoor locations include Types 3, 3R, 3S, 4, 4X, 6 and 6P.

In some cases, individual appliances and equipment may be marked “Raintight” or “Rainproof” indicating that they have been subjected to a test designed to simulate exposure to beating rain. For equipment designated as “Raintight” such exposure will not result in entrance of water. For equipment designated as “Rainproof” such exposure will not interfere with the operation of the apparatus or result in wetting of live parts and wiring within the enclosure.

Additionally or alternatively, IEC 60529, “Degrees of Protection Provided by Enclosures (IP Code),” describes a system for classifying the degrees of ingress protection (or IP Code) provided by the enclosures of electrical equipment as follows:

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First Characteristic Numeral	Protection Against Ingress of Solid Foreign Objects • Degrees of Protection Against Access to Hazardous Parts	Second Characteristic Numeral	Degrees of Protection Against Ingress of Water Harmful Effects
IP0X	• Nonprotected	IPX0	Nonprotected
IP1X	• Nonprotected • 50 mm diameter and greater	IPX1	Vertically dripping
IP2X	• Back of hand • 12.5 mm diameter and greater	IPX2	Dripping (15 degrees tilted)
IP3X	• Finger • 2.5 mm diameter and greater	IPX3	Spraying
IP4X	• Tool • 1.0 mm diameter and greater	IPX4	Splashing
IP5X	• Wire • Dust-protected	IPX5	Jetting
IP6X	• Wire • Dust-tight	IPX6	Powerful jetting
		IPX7	Temporary immersion
		IPX8	Continuous immersion

FITTINGS AT SUPPLY ENTRIES

Consideration should be given to the Type or IP rating of fittings used at supply entries. When the manufacturer supplies a fitting with the enclosure, enclosures are to be connected to the wiring system using the fitting provided. If no fitting is provided by the manufacturer, the fitting employed must meet or exceed the Type or IP rating of the enclosure, so that the assembly maintains its protection against contaminants.

CABLE AND CONDUIT SEALS

Equipment with a factory-installed conduit seal is marked "Leads factory sealed," or equivalent wording. The absence of this marking indicates that the need for a field-installed seal in accordance with Section 501.15 or 502.15 of the NEC should be determined.

PROCESS SEALS

Process-connected electrical equipment provided with seals to prevent the migration of process fluids into the electrical system are either the single-seal or dual-seal types. The construction, testing and marking requirements for process seals are found in ANSI/ISA-12.27.01, "Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids."

WIRING METHODS

Wiring methods permitted by the NEC for hazardous (classified) locations are, in general, more restrictive than those permitted for unclassified locations. Extra-hard-usage flexible cord is only permitted for connection of portable luminaires and other types of portable utilization equipment and the fixed portion of their supply circuit, or in other situations where flexibility is necessary for the installation as determined by the Authority Having Jurisdiction.

REQUIREMENTS

The standards used to investigate these products address the risk of explosion associated with installation in a hazardous (classified) location, as well as the risk of fire and electric shock associated with any electrical equipment. Unless indicated otherwise in the Guide Information for the product category, the basic hazardous (classified) locations standards used to investigate these products with respect to risk of explosion are referenced below for the protection techniques shown.

Protection Technique	Standard
Explosion-proof and dust-ignition-proof	ANSI/UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations"
Intrinsic safety	ANSI/UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous (Classified) Locations"
Nonincendive circuits, components and equipment; hermetically sealed and sealed components; nonsparking equipment; dust-tight enclosures	ANSI/ISA-12.12.01, "Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations"

EQUIPMENT FOR USE IN AND RELATING TO CLASS I, II AND III, DIVISION 1 AND 2 HAZARDOUS LOCATIONS (AAIZ)

Protection Technique	Standard
Purged and pressurized	ANSI/NFPA 496, "Purged and Pressurized Enclosures for Electrical Equipment"

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

GLOBAL POSITIONING SYSTEMS

If provided as part of the equipment, global positioning system (GPS) and/or enhanced 911 (E911) hardware, GPS and/or E911 operating software, or other GPS-related and/or E911-related aspects of equipment have not been investigated for performance or reliability. The equipment has only been investigated for the explosion, fire, shock and casualty hazards required by the applicable hazardous (classified) locations standards. Certification of the equipment does not cover the performance or reliability of any GPS and/or E911 hardware, GPS and/or E911 operating software, or other GPS-related and/or E911-related aspects of the equipment. **UL makes no representations, warranties or certifications whatsoever regarding the performance or reliability of any GPS-related and/or E911-related functions of the equipment.**

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

MARINE EQUIPMENT

Certain equipment has been specifically investigated and certified for use aboard marine vessels. Such equipment has been investigated in accordance with the applicable requirements of UL, the United States Coast Guard, the American Boat and Yacht Council, Inc., and the National Fire Protection Association. For additional information, see the general Guide Information for the specific product category. Equipment bearing UL's Marine Mark is suitable for use only with stranded copper wire.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRICAL EQUIPMENT FOR USE IN ORDINARY LOCATIONS (AALZ)

GENERAL

Electrical equipment for use in unclassified (ordinary) locations is intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). Electrical equipment for use in hazardous (classified) locations, as defined by the NEC, may also be used in ordinary locations.

INVESTIGATION REQUIREMENTS AND STANDARDS

Electrical equipment for use in ordinary locations has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the NEC.

Some products are certified for uses not within the scope of the NEC. Such products are investigated for the specifications or the use conditions indicated in the general Guide Information for each product category.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

ELECTRICAL EQUIPMENT FOR USE IN ORDINARY LOCATIONS (AALZ)

The general Guide Information for each product category describes the limitations relative to the products covered, such as current, voltage and horsepower limits, markings, special descriptions and installation provisions.

INSTALLATION REQUIREMENTS

Ordinary locations, as defined in the NEC, include:

Damp Location — Partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, barns, and cold-storage warehouses.

Dry Location — A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.

Wet Location — Installations underground or in concrete slabs or masonry in direct contact with the earth, and locations subject to saturation with water or other liquids, such as vehicle washing areas, and locations exposed to weather and unprotected.

Outdoor Use — In general, individual appliances and equipment have been investigated only for use indoors, in dry locations. An exception is where outdoor use is specifically permitted by the Article of the NEC concerned with the product installation. See also the general Guide Information for the product category or included in the individual Listing. In some cases the title (e.g., Snow Movers, Swimming Pool Fixtures) indicates the conditions for which the product has been investigated.

Cord- and plug-connected appliances obviously intended for outdoor use, such as gardening appliances, are not intended for use in the rain, and should be stored indoors when not in use.

Enclosure Types

Section 110.11 of the NEC specifies that equipment shall be identified for use in certain operating environments. Section 300.6 provides guidance regarding protection against corrosion and Table 430.91 provides the basis for selecting motor controller enclosure types for use in specific locations. To assist inspection authorities, UL requires type designations on power distribution and control equipment enclosures such as cabinets and cutout boxes, enclosed panelboards or switchboards, meter sockets, enclosed circuit breakers or switches, industrial control and other equipment. The following table summarizes the intended uses of the various type enclosures for other than hazardous locations:

Enclosure Type Number	Provides a Degree of Protection Against the Following Environmental Conditions*
1	Indoor use
2	Indoor use, limited amounts of falling water
3R	Outdoor use, undamaged by the formation of ice on the enclosure**
3RX	Same as 3R plus resists corrosion
3	Same as 3R plus windblown dust
3X	Same as 3 plus resists corrosion
3S	Same as 3R plus windblown dust, external mechanisms remain operable while ice laden
3SX	Same as 3S plus resists corrosion
4	Outdoor use, splashing water, windblown dust, hose-directed water, undamaged by the formation of ice on the enclosure**
4X	Same as 4 plus resists corrosion
5	Indoor use to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids
6	Same as 3R plus entry of water during temporary submersion at a limited depth
6P	Same as 3R plus entry of water during prolonged submersion at a limited depth
12, 12K	Indoor use, dust, dripping noncorrosive liquids
13	Indoor use, dust, spraying water, oil and noncorrosive coolants

*All type enclosures provide a degree of protection against ordinary corrosion and against accidental contact with the enclosed equipment when doors of covers are closed and in place. All type enclosures provide protection against a limited amount of falling dirt.

**All outdoor type enclosures provide a degree of protection against rain, snow and sleet. Outdoor enclosures are also suitable for use indoors if they meet the environmental conditions present.

An enclosure that complies with the requirements for more than one type of enclosure may be marked with multiple designations.

Enclosures marked with a type may also be marked as follows:

- A Type 1 enclosure may be marked "Indoor Use Only"
- A Type 3, 3X, 3S, 3SX, 4, 4X, 6 or 6P enclosure may be marked "Raintight"
- A Type 3R or 3RX enclosure may be marked "Rainproof"
- A Type 4, 4X, 6 or 6P enclosure may be marked "Watertight"
- A Type 3X, 3RX, 3SX, 4X or 6P enclosure may be marked "Corrosion Resistant"

ELECTRICAL EQUIPMENT FOR USE IN ORDINARY LOCATIONS (AALZ)

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- A Type 2, 5, 12, 12K or 13 enclosure may be marked "Driptight"
- A Type 3, 3X, 3S, 3SX, 5, 12K or 13 enclosure may be marked "Dust-tight"

For equipment designated "Raintight," testing designed to simulate exposure to a beating rain will not result in entrance of water. For equipment designated "Rainproof," testing designed to simulate exposure to a beating rain will not interfere with the operation of the apparatus or result in wetting of live parts and wiring within the enclosure. "Watertight" equipment is so constructed that water does not enter the enclosure when subjected to a stream of water. "Corrosion resistant" equipment is so constructed that it provides degree of protection against exposure to corrosive agents such as salt spray.

"Driptight" equipment is so constructed that falling moisture or dirt does not enter the enclosure. "Dusttight" equipment is so constructed that circulating or airborne dust does not enter the enclosure.

Sizes and Ratings

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

Marked ratings of utilization equipment include ampere, wattage or volt-ampere ratings. Motor-operated utilization equipment may also be marked with a horsepower rating. The actual marked ratings (other than the horsepower rating) and other markings or instructions, if any, are to be used to select branch-circuit conductors, branch-circuit overcurrent protection, control devices and disconnecting means.

The ampere or wattage marking on power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Appliance and Utilization Equipment Terminations

Except as noted in the general Guide Information for some product categories, most terminals, unless marked otherwise, are for use only with copper wire. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in higher rated circuits as specified in Table 310.16 of the NEC. If the termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75 or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Distribution and Control Equipment Terminations

Most terminals are suitable for use only with copper wire. Where aluminum or copper-clad aluminum wire can or shall be used (some crimp terminals may be Listed only for aluminum wire), there is marking to indicate this. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted in the following paragraphs or in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C ampacities for wire size Nos. 14-1 AWG, and 75°C ampacities for wire size Nos. 1/0 AWG and larger, as specified in Table 310.16 of the NEC.

Some distribution and control equipment is marked to indicate the required temperature rating of each field-installed conductor. If the equipment, normally intended for connection by wire sizes within the range 14-1 AWG, is marked "75C" or "60/75C," it is intended that 75°C insulated wire may be used at full 75°C ampacity. Where the connection is made to a circuit breaker or switch within the equipment, such a circuit breaker or switch must also be marked for the temperature rating of the conductor.

A 75°C conductor temperature marking on a circuit breaker or switch normally intended for wire sizes 14-1 AWG does not in itself indicate that 75°C insulated wire can be used unless 1) the circuit breaker or switch is used by itself, such as in a separate enclosure, or 2) the equipment in which the circuit breaker or switch is installed is also so marked.

ELECTRICAL EQUIPMENT FOR USE IN ORDINARY LOCATIONS (AALZ)

A 75 or 90°C temperature marking on a terminal (e.g., AL7, CU7AL, AL7CU or AL9, CU9AL, AL9CU) does not in itself indicate that 75 or 90°C insulated wire can be used unless the equipment in which the terminals are installed is marked for 75 or 90°C.

Higher temperature rated conductors than specified may be used if the size is based on the above statements.

Copper-clad Aluminum Conductors — Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

Copper Pigtail Leads — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Wiring Devices — Supply terminals of 15 A and 20 A switches and receptacles not marked “CO/ALR” are for use with copper and copper-clad aluminum conductors only. Terminals marked “CO/ALR” are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded, unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked “AL/CU” are for use with copper conductors only. Terminals of switches rated 30 A and above marked “AL/CU” are for use with aluminum, copper and copper-clad aluminum conductors.

Wire Connectors — Combinations of dissimilar conductors in terminal or splicing connectors are acceptable only in dry locations and when the connectors are identified as suitable for such intermixing. See also the information under Wire Connectors and Soldering Lugs (ZMVB).

Terminals — Product terminals, including wire connectors and terminal screws, are acceptable for connection of only one conductor, unless there is marking or a wiring diagram indicating the number of conductors which may be connected.

Tightening Torque — Some equipment may be marked to show a tightening torque for wire connectors intended for use with field wiring.

Supply Cords — When flexible supply cords or cord sets are replaced on utilization equipment and appliances, the replacement should be of the same type, AWG size, voltage rating and temperature rating as originally used.

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer’s declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL’s safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

MARINE EQUIPMENT

Certain equipment has been specifically investigated and certified for use aboard marine vessels. Such equipment has been investigated in accordance with the applicable requirements of UL, the United States Coast Guard (USCG), the American Boat and Yacht Council, Inc. (ABYC), and the National Fire Protection Association (NFPA). For additional information, see the general Guide Information for the specific product category. Equipment bearing UL’s Marine Mark is suitable for use only with stranded copper wire.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MECHANICAL EQUIPMENT AND ASSOCIATED PRODUCTS (AAME)

GENERAL

Mechanical equipment includes mechanically operated and gasoline-powered products, worker safety-related products, toys, and other products

MECHANICAL EQUIPMENT AND ASSOCIATED PRODUCTS (AAME)

that have been investigated for mechanical strength and operation with regard to personal injury and for other specific hazards.

This equipment is intended for use only as described in the general Guide Information for each product category and individual Listings. This equipment has only been investigated for use as described in the instructions and markings provided with the equipment. The use of the equipment in conditions other than described in the instructions, markings and the general Guide Information for the applicable product category has not been investigated by UL.

INVESTIGATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association (NFPA), and applicable model codes identified in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are investigated for the specifications or use conditions indicated in the general Guide Information for each product category.

These products are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer’s declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL’s safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

INDOOR AND OUTDOOR USE

Unless outdoor use is specifically indicated in the general Guide Information for the product category or included in the individual Listings of the product, individual appliances have been investigated only for use indoors, unless the product, by its inherent nature, is obviously intended for use outdoors.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EQUIPMENT FOR USE IN AND RELATING TO ZONE CLASSIFIED HAZARDOUS LOCATIONS (AANZ)

GENERAL

Electrical equipment intended for use in and relating to Class I, Zone 0, 1 and 2 and Zone 20, 21 and 22 hazardous (classified) locations has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of Articles 505 and 506 of ANSI/NFPA 70, "National Electrical Code" (NEC), or United States Coast Guard (USCG) Electrical Engineering Regulations 46CFR110, "General Provisions," 46CFR111, "Electric Systems – General Requirements," 46CFR112, "Emergency Lighting and Power Systems," and 46CFR113, "Communication and Alarm Systems and Equipment." Attention is called to the limitations of the individual Listings and Classifications specified in the general Guide Information for each product category, such as current, voltage, horsepower limits, markings, special descriptions and installation provisions.

Unless equipment is identified in 1) the product category title as relating to Zone classified hazardous locations or 2) the individual Listings as apparatus for use in unclassified locations, all product categories contain electrical equipment for use in Class I, Zone 0, 1 and 2 and Zone 20, 21 and 22 hazardous (classified) locations.

Regarding electrical equipment for use in and relating to Division classified locations, some general technical information is provided together with the specific technical information provided regarding Zone classified locations. For additional specific technical information regarding Division classified locations, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

Electrical equipment for use in and relating to hazardous (classified) locations must also comply with the applicable requirements for the same type of equipment for use in unclassified locations. For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

HAZARDOUS (CLASSIFIED) LOCATIONS — GENERAL INFORMATION

Hazardous (classified) locations, as defined in the NEC, are locations where fire or explosion hazards may exist due to the presence of flammable gases, vapors or flammable liquids, combustible dusts, or ignitable fibers or flyings.

There are two independent classification systems. One system is found in Articles 505 and 506 of the NEC.

Article 505 divides locations having gases and vapors into Class I, Zones and Gas Groups. A Zone 0 location is a location where ignitable concentrations are present continuously or for long periods of time. A Zone 1 location is a location where ignitable concentrations are likely to exist under normal operating conditions. A Zone 2 location is a location where ignitable concentrations are not likely to occur in normal operation and, if they do occur, will only persist for a short period.

Article 506 divides locations having dusts, fibers or flyings into Zones. A Zone 20 location is a location where ignitable concentrations are present continuously or for long periods of time. A Zone 21 location is a location where ignitable concentrations are likely to exist under normal operating conditions. A Zone 22 location is a location where ignitable concentrations are not likely to occur in normal operation and, if they do occur, will only persist for a short period.

The other classification system, found in Article 500 of the NEC, divides all hazardous (classified) locations into Classes, Divisions and Groups. A Division 1 location is a location where an ignitable concentration of a flammable or combustible material is present under normal operating conditions. A Division 2 location is a location where an ignitable concentration of a flammable or combustible material is present only under abnormal operating conditions.

Protection against explosion in hazardous (classified) locations requires that all equipment that could be exposed to the flammable or combustible atmospheres be of a type suitable for installation in such locations. The Classes, Zones and Groups for which equipment has been Listed or Classified is shown in the individual Listings and Classifications under the respective categories and is marked on the equipment itself. In addition, intrinsically safe circuit-wiring terminals and intrinsically safe equipment is marked "Intrinsically Safe."

Gas and Vapor Groups

The following paragraphs group flammable and explosive mixtures of specific gases and vapors in accordance with the NEC classifications. For a complete list of group classifications for Class I materials, see ANSI/NFPA 497, "Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas," or IEC 60079-12, "Classification of Mixtures of Gases or Vapors with Air According to their Maximum Experimental Safe Gaps and Minimum Igniting Currents."

Equipment for use in Class I, Zone 0, 1 and 2 hazardous (classified) locations, as defined in Article 505 of the NEC, is tested with respect to acceptability of operation in the presence of flammable and explosive mix-

tures of specific vapors and gases with air. For purposes of location classification, such mixtures have been grouped on the basis of their characteristics as follows:

Class I, Group IIC — Atmospheres containing hydrogen, acetylene, or gases or vapors having either a maximum experimental safe gap (MESG) less than or equal to 0.50 mm or a minimum igniting current ratio (MIC ratio) less than or equal to 0.45.

Class I, Group IIB — Atmospheres containing acetaldehyde, ethylene, or gases or vapors having either a maximum experimental safe gap (MESG) greater than 0.50 mm and less than or equal to 0.90 mm, or a minimum igniting current ratio (MIC ratio) greater than 0.45 and less than or equal to 0.80.

Class I, Group IIA — Atmospheres containing acetone, ammonia, ethyl alcohol, gasoline, methane, propane, or gases of vapors having either a maximum experimental safe gap (MESG) greater than 0.90 mm or a minimum igniting current ratio (MIC ratio) greater than 0.80.

Equipment for use in Class I, Division 1 and 2 hazardous (classified) locations, as defined in Article 500 of the NEC, is tested with respect to acceptability of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. For purposes of location classification, such mixtures have been grouped on the basis of their characteristics as follows:

Class I, Group A — Atmospheres containing acetylene.

Class I, Group B — Atmospheres containing gases or vapors having either a maximum experimental safe gap (MESG) less than or equal to 0.45 mm or a minimum igniting current ratio (MIC ratio) less than or equal to 0.40. Examples of Group B materials are acrolein, butadiene, ethylene oxide, propylene oxide, hydrogen, and fuel and combustible process gases containing more than 30% hydrogen by volume.

Class I, Group C — Atmospheres containing gases or vapors having either a maximum experimental safe gap (MESG) greater than 0.45 mm and less than or equal to 0.75 mm, or a minimum igniting current ratio (MIC ratio) greater than 0.40 and less than or equal to 0.80. Examples of Group C materials are ethyl ether and ethylene.

Class I, Group D — Atmospheres containing gases or vapors having either a maximum experimental safe gap (MESG) greater than 0.75 mm or a minimum igniting current ratio (MIC ratio) greater than 0.80. Examples of Group D materials are acetone, ammonia, benzene, butane, cyclopropane, ethanol, gasoline, hexane, methane, methanol, naphtha and propane.

The following table compares Class I, Division 1 and 2 Gas Groups with Class I, Zone 0, 1 and 2 Gas Groups. The gases shown are representative of others in the Group.

Division 1 and 2	Zone 0, 1 and 2
A (acetylene)	IIC (acetylene and hydrogen)
B (hydrogen)	IIC (acetylene and hydrogen)
C (ethylene)	IIB (ethylene)
D (propane)	IIA (propane)

Dust Groups

There are no dust groups for Zone 20, 21 or 22. In addition, Article 506 of the NEC does not cover locations where metal dusts are present.

Equipment for use in Class II hazardous (classified) locations, as defined in Article 500 of the NEC, is tested with respect to acceptability of operation in the presence of combustible dusts in air. For purposes of location classification, the NEC groups combustible dust-air mixtures as follows:

Class II, Group E — Atmospheres containing combustible metal dusts, including aluminum, magnesium, and their commercial alloys, or other combustible dusts whose particle size, abrasiveness and conductivity present an equivalent hazard.

Class II, Group F — Atmospheres containing carbon black, charcoal, coal or coke dusts which have more than 8% total volatile material, or atmospheres containing these dusts sensitized by other materials so that they present an explosion hazard.

Class II, Group G — Atmospheres containing combustible dusts not included in Group E or F, including flour, grain, wood, plastic and chemicals.

Intrinsically Safe Circuits and Apparatus, and Associated Apparatus

Intrinsically safe circuits and apparatus may be investigated for any or all of the Zones and Groups as defined in the NEC. In an intrinsically safe circuit, the energy level available in the hazardous (classified) location under normal and abnormal conditions is sufficiently low as not to cause ignition of the specified explosive atmospheres. To maintain the low energy levels, it is necessary that the intrinsically safe and associated apparatus be installed and interconnected in accordance with Articles 504 and 505 of the NEC and the instructions provided with the equipment.

Associated apparatus is apparatus in which the circuits are not necessarily intrinsically safe, but which affect the energy in the intrinsically safe circuits and are relied upon to maintain intrinsic safety. Associated apparatus is not intended for use in hazardous (classified) locations unless use in hazardous (classified) locations is specifically indicated.

When interconnecting associated apparatus with equipment for use in the hazardous (classified) location, special attention should be paid to

EQUIPMENT FOR USE IN AND RELATING TO ZONE CLASSIFIED HAZARDOUS LOCATIONS (AANZ)

installation instructions, control drawings, or product markings which may limit the types of connections that are acceptable.

Equipment Relating to Hazardous (Classified) Locations

Equipment relating to hazardous (classified) locations includes electrical equipment not intended for installation in hazardous (classified) locations except for provision of certain intrinsically safe (low energy) circuit extensions as indicated in the individual Listings and Classifications.

Suitability of Listed or Classified Equipment

Equipment marked for use in or relating to Class I, Zone 0 locations is also suitable for Zone 1 and 2 locations of the same gas group and with a suitable temperature class. Equipment marked for use in or relating to Class I, Zone 1 locations is also suitable for use in or relating to Class I, Zone 2 locations of the same gas group and with a suitable temperature class.

Equipment marked for use in or relating to Class I, Zone 2 locations is suitable only for use in or relating to those locations classified as Class I, Zone 2.

Equipment marked for use in or relating to Zone 20 locations is also suitable for Zone 21 and 22 locations with a suitable temperature class. Equipment marked for use in or relating to Zone 21 locations is also suitable for use in or relating to Zone 22 locations with a suitable temperature class.

Equipment marked for use in or relating to Zone 22 locations is suitable only for use in or relating to those locations classified as Zone 22.

The NEC also permits the following:

- Intrinsically safe equipment for Class I, Division 1 locations to be used in a Class I, Zone 0, 1 or 2 location of the same gas group and with a suitable temperature class.
- Equipment (other than intrinsically safe equipment) for Class I, Division 1 locations to be used in a Class I, Zone 1 or 2 location of the same gas group and with a suitable temperature class.
- Equipment for Class I, Division 2 locations to be used in a Class I, Zone 2 location of the same gas group and with a suitable temperature class.
- Equipment for Class I, Zone 0 locations to be used in a Class I, Division 1 or 2 location of the same gas group and with a suitable temperature class.
- Equipment for Class I, Zone 0, 1 or 2 locations to be used in a Class I, Division 2 location of the same gas group and with a suitable temperature class.
- Equipment for Class II, Division 1 locations to be used in a Zone 21 or 22 location with a suitable temperature class.
- Equipment for Class II, Division 2 locations to be used in a Zone 22 location with a suitable temperature class.
- Equipment for Zone 20 locations to be used in a Class II, Division 1 location of the same dust and with a suitable temperature class.
- Equipment for Zone 20, 21 or 22 locations to be used in a Class II, Division 2 location of the same dust and with a suitable temperature class.
- Equipment for Zone 20 locations with a temperature class of not greater than T120C for equipment subject to overloading or not greater than T165C for equipment not subject to overloading to be used in a Class III, Division 1 location.
- Equipment for Zone 20, 21 or 22 locations with a temperature class of not greater than T120C for equipment subject to overloading or not greater than T165C for equipment not subject to overloading to be used in a Class III, Division 2 location.

In addition, equipment for use in hazardous (classified) locations is also suitable for use in unclassified locations.

RELATED EQUIPMENT

For additional information on electrical equipment for use in and relating to Division classified locations, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

For additional information on electrical equipment for use in unclassified locations, see Electrical Equipment for Use in Ordinary Locations (AALZ).

CLASS I, ZONE 0, 1 AND 2 PROTECTION TECHNIQUES

Equipment for use in Class I, Zone 0, 1 or 2 locations may employ one or more of the following protection techniques:

Location Classification	Protection Technique	Protection Technique Identification
Zone 0	Intrinsic safety (2 fault)	ia
	Encapsulation	ma
Zone 1	Intrinsic safety (1 fault)	ib
	Flameproof	d, db
	Purged and pressurized	px, pxb, py, pyb
	Oil immersion	o, ob
	Increased safety	e, eb

EQUIPMENT FOR USE IN AND RELATING TO ZONE CLASSIFIED HAZARDOUS LOCATIONS (AANZ)

Location Classification	Protection Technique	Protection Technique Identification
Zone 2	Encapsulation	m, mb
	Powder filling	q, qb
	Nonsparking	nA, nAc
Unclassified	Sparkling with protected contacts	nC, nCc
	Restricted breathing	nR, nRc
	Intrinsic safety (no faults)	ic
	Associated apparatus with intrinsically safe circuit connections for Zone 0 (2 fault)	[ia]
	Associated apparatus with intrinsically safe circuit connections for Zone 1 (1 fault)	[ib]
	Associated apparatus with intrinsically safe circuit connections for Zone 2 (no faults)	[ic]

Intrinsic Safety — Equipment in which any spark or thermal effect produced under normal or fault conditions is incapable of causing ignition of the atmosphere. See **Intrinsically Safe Circuits and Apparatus, and Associated Apparatus** above for more information.

Flameproof — The enclosure of the equipment will withstand an internal explosion, and prevent passage of flame to the surrounding atmosphere. Care must be taken to maintain the length and clearance (gap) of flame-proof joints in service.

Purged and Pressurized — A protective gas is maintained inside the equipment enclosure at a pressure above that of the surrounding atmosphere, in order to prevent ingress of the explosive gas or vapor.

Oil Immersion — Parts capable of ignition are immersed in a protective liquid.

Increased Safety — The equipment contains no normally arcing parts, and additional measures (such as larger spacings between wiring connections) are taken to prevent the possibility of high temperatures or sparks. A minimum IP rating of IP 54 is required.

Encapsulation — Parts capable of ignition are completely surrounded by an encapsulating material.

Powder Filling — Parts capable of ignition are surrounded by a filling material (glass or quartz powder).

Nonsparking — The equipment has no normally arcing parts or thermal effects capable of ignition.

Sparkling with Protected Contacts — Arcing contacts are in nonincendive circuits, or are inside a hermetically sealed container or sealed device.

Restricted Breathing — The enclosure relies on tight seals and gaskets to prevent diffusion of the explosive atmosphere into the equipment enclosure. Provision for checking that the restricted breathing properties of the enclosure are maintained is provided.

ZONE 20, 21 AND 22 PROTECTION TECHNIQUES

Equipment for use in Zone 20, 21 or 22 locations may employ one or more of the following protection techniques:

Location Classification	Protection Technique	Protection Technique Identifier
Zone 20	Intrinsic safety (2 fault)	ia, iaD
	Encapsulation	ma, maD
	Dust-ignition-protected enclosure	ta
Zone 21	Intrinsic safety (1 fault)	ib, ibD
	Encapsulation	mb, mbD
	Pressurization	p, pb, pD
	Dust-ignition-protected enclosure	tb, tD
Zone 22	Pressurization	p, pb, pD
	Dust-ignition-protected enclosure	tc, tD
Unclassified	Associated apparatus with intrinsically safe circuit connections for Zone 20 (2 fault)	[ia], [iaD]
	Associated apparatus with intrinsically safe circuit connections for Zone 21 (1 fault)	[ib], [ibD]

Intrinsic Safety — Equipment in which any spark or thermal effect produced under normal or fault conditions is incapable of causing ignition of the atmosphere. See **Intrinsically Safe Circuits and Apparatus, and Associated Apparatus** above for more information.

EQUIPMENT FOR USE IN AND RELATING TO ZONE CLASSIFIED HAZARDOUS LOCATIONS (AANZ)

Encapsulation — Parts capable of ignition are completely surrounded by an encapsulating material.

Pressurization — A protective gas is maintained inside the equipment enclosure at a pressure above that of the surrounding atmosphere, in order to prevent ingress of dust.

Dust-ignition-protected Enclosure — Parts are provided in an enclosure that prevents the ingress of dust.

The protection technique identification letter(s) is marked on the product. Products employing multiple protection techniques are marked with all applicable identifications. For example, a control station containing a flameproof switch and an encapsulated pilot light, mounted in an increased safety enclosure, will be marked with all three protection techniques: “edm.”

TEMPERATURE CONSIDERATIONS

The marked temperature class (T-code) of the equipment is based on either the maximum external temperature or internal temperature of the equipment, depending on the protection technique used. The marking specifies the temperature class or operating temperature based on a +40°C (+104°F) ambient temperature, or based on the higher ambient temperature if the equipment is rated and marked for an ambient temperature of greater than +40°C (+104°F). For equipment rated and marked for an upper ambient temperature of less than +40°C (+104°F), the operating temperature or temperature class is still based on +40°C (+104°F).

For Class I, Zone 0, 1 and 2 and Zone 20, 21 and 22 locations, this temperature marking should not exceed the ignition temperature of the specific combustible material to be encountered. For organic dusts that may dehydrate or carbonize, the temperature marking should not exceed the lower of either the ignition temperature or 165°C. For fibers and flyings, the maximum permitted temperature is 120°C for equipment that is subject to overloading and 165°C for equipment that is not subject to overloading.

AMBIENT TEMPERATURES

Unless the equipment is marked otherwise, it has been investigated only for use under normal atmospheric conditions in an ambient temperature within the range of -20°C (-4°F) to +40°C (+104°F). Equipment may be investigated and marked for a lower ambient temperature that is greater than -25°C (-13°F). While equipment may be marked for an upper ambient temperature that is less +40°C (+104°F), equipment is always investigated for an upper ambient temperature of at least +40°C (+104°F).

Use of flameproof equipment under conditions of higher than normal atmospheric pressure or oxygen partial pressure, use in artificial atmospheres, and use under conditions of excessively high ambient temperatures can increase the likelihood of ignition of flammable atmospheres. In addition, low ambient temperatures may increase explosion pressures developed within the equipment. Plastic parts of enclosures or encapsulating materials may not maintain their integrity in excessively high or low ambient, unless marked otherwise.

ENCLOSURE MODIFICATION AND MAINTENANCE

The integrity of an enclosure must be maintained. Making holes (other than conduit openings specified in the instructions) or alterations in the enclosure during installation may compromise the ability of a flameproof enclosure to contain an explosion. Most other protection techniques require a minimum IP rating and alterations in the enclosure may impair the enclosure’s ability to protect against ingress of contaminants or water. See **ENCLOSURE CONSIDERATIONS FOR ALL EQUIPMENT** below for more information. Holding bolts and threaded parts must be screwed tight. The continued acceptability of the equipment will depend upon proper maintenance.

ENVIRONMENTAL CONSIDERATIONS

Unless the equipment is marked otherwise, it is intended to be used indoors where severe corrosive conditions are not likely to be present. Equipment investigated for severe environmental conditions is marked with an enclosure type designation or other designation indicating the suitability of the equipment in different environments. See **ENCLOSURE CONSIDERATIONS FOR ALL EQUIPMENT** below for more information.

ENCLOSURE CONSIDERATIONS FOR ALL EQUIPMENT

Section 110.11 of the NEC directs that equipment shall not be used in damp or wet locations; locations where exposed to gases, fumes, vapors, liquids or other agents having a deteriorating effect on the equipment; or locations where exposed to excessive temperatures unless the equipment is identified for use in such environments. Section 300.6 of the NEC provides guidance regarding protection against corrosion. To assist Authorities Having Jurisdiction, electrical equipment Listed or Classified for use in and relating to hazardous (classified) locations may be investigated for use in certain operating environments and marked with an enclosure type number(s). The following table summarizes the intended uses of the various enclosure types.

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Provides a Degree of Protection Against the Following Environmental Conditions:	Type of Enclosure																
	1	2	3	3R	3S	3X	3RX	3SX	4	4X	5	6	6P	12	12K	13	
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Falling dirt	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dripping and light splashing of noncorrosive liquids	—	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Rain, snow and sleet	—	—	X	X	X	X	X	X	X	X	—	X	X	—	—	—	—
Rain, snow and sleet (external mechanism shall be operable when ice covered)	—	—	—	—	X	—	—	X	—	—	—	—	—	—	—	—	—
Circulating dust, lint, fibers and flyings	—	—	X	—	X	X	—	X	X	X	—	X	X	X	X	X	X
Settling airborne dust, lint, fibers and flyings	—	—	X	—	X	X	—	X	X	X	—	X	X	X	X	X	X
Windblown dust	—	—	X	—	X	X	—	X	X	X	—	X	X	—	—	—	—
Hosedown and splashing water	—	—	—	—	—	—	—	—	X	X	—	X	X	—	—	—	—
Oil and coolant seepage	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	X	X
Oil or coolant spraying and splashing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X
Corrosive agents	—	—	—	—	—	X	X	X	—	X	—	—	X	—	—	—	—
Occasional temporary submer-sion	—	—	—	—	—	—	—	—	—	—	—	X	X	—	—	—	—
Occasional prolonged submer-sion	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—

PRODUCT CATEGORIES BY CATEGORY CODE

In some cases, individual appliances and equipment may be marked “Raintight” or “Rainproof,” indicating that they have been subjected to a test designed to simulate exposure to beating rain. For equipment designated as “Raintight” such exposure will not result in entrance of water. For equipment designated as “Rainproof” such exposure will not interfere with the operation of the apparatus or result in wetting of live parts and wiring within the enclosure.

Enclosures for indoor locations include Types 1, 2, 5, 7, 9, 12, 12K and 13; enclosures for indoor or outdoor locations include Types 3, 3R, 3S, 4, 4X, 6 and 6P.

Additionally or alternatively, IEC 60529, “Degrees of Protection Provided by Enclosures (IP Code),” describes a system for classifying the degrees of ingress protection (or IP Code) provided by the enclosures of electrical equipment as follows:

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First Characteristic Numeral	Degrees of Protection Against Ingress of Solid Foreign Objects Protection Against Access to Hazardous Parts	Second Characteristic Numeral	Degrees of Protection Against Ingress of Water Harmful Effects
IP0X	• Nonprotected	IPX0	Nonprotected
IP1X	• Nonprotected	IPX1	Vertically dripping
IP2X	• 50 mm diameter and greater • Back of hand	IPX2	Dripping (15 degrees tilted)
IP3X	• 12.5 mm diameter and greater • Finger	IPX3	Spraying
IP4X	• 2.5 mm diameter and greater • Tool	IPX4	Splashing
IP5X	• 1.0 mm diameter and greater • Wire	IPX5	Jetting
IP6X	• Dust-protected • Wire	IPX6	Powerful jetting
		IPX7	Temporary immersion
		IPX8	Continuous immersion

FITTINGS AT SUPPLY ENTRIES

Consideration should be given to the Type or IP rating of fittings used at supply entries. When the manufacturer supplies a fitting with the enclosure, enclosures are intended to be connected to the wiring system using the fitting provided. If no fitting is provided by the manufacturer, the fitting employed must meet or exceed the Type or IP rating of the enclosure, so that the assembly maintains its protection against contaminants.

CABLE AND CONDUIT SEALS

Equipment with a factory-installed conduit seal is marked "Leads factory sealed," or equivalent wording. The absence of this marking indicates that the need for a field-installed seal in accordance with Section 505.16 of the NEC should be determined.

PROCESS SEALS

Process-connected electrical equipment provided with seals to prevent the migration of process fluids into the electrical system are either the single-seal or dual-seal types. The construction, testing and marking requirements for process seals are found in ANSI/ISA-12.27.01, "Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids."

PROTECTION OF EQUIPMENT AND TRANSMISSION SYSTEMS USING OPTICAL RADIATION

Equipment and transmission systems that use optical radiation and are intended for use in hazardous (classified) locations may pose a risk of ignition. This includes equipment and systems, which themselves are located outside the hazardous (classified) locations, but their emitted optical radiation enters such locations. The construction, testing and marking requirements that may be applied for such equipment and systems are found in ANSI/ISA-60079-28 (12.21.02), "Explosive Atmospheres – Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation." The protection technique identification for equipment and systems that comply with these requirements and that may be marked on the equipment include "op is," "op pr" or "op sh," with the identified Zone dependent upon the design of the equipment.

WIRING METHODS

Wiring methods permitted by the NEC for hazardous (classified) locations are, in general, more restrictive than those permitted for unclassified locations. Extra-hard-usage flexible cord is only permitted for connection of portable luminaires and other types of portable utilization equipment and the fixed portion of their supply circuit, or in other situations where flexibility is necessary for the installation as determined by the Authority Having Jurisdiction.

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate these products with respect to risk of explosion for Class I, Zone 0, 1 and 2 are referenced below for the location classifications and protection techniques shown. Note that for all equipment, ANSI/UL 60079-0, "Explosive Atmospheres – Part 0: Equipment – General Requirements," is also used.

EQUIPMENT FOR USE IN AND RELATING TO ZONE CLASSIFIED HAZARDOUS LOCATIONS (AANZ)

Location Classification	Standard	Protection Technique Identification
Zone 0	ANSI/UL 60079-11, "Explosive Atmospheres – Part 11: Equipment Protection by Intrinsic Safety 'i'"	ia
	ANSI/UL 60079-18, "Explosive Atmospheres – Part 18: Equipment Protection by Encapsulation 'm'"	ma
Zone 1	ANSI/UL 60079-1, "Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures 'd'"	d
	ANSI/ISA-60079-2 (12.04.01), "Explosive Atmospheres – Part 2: Equipment Protection by Pressurized Enclosures 'p'"	px, py
	ANSI/UL 60079-5, "Explosive Atmospheres – Part 5: Equipment Protection by Powder Filling 'q'"	q
	ANSI/UL 60079-6, "Explosive Atmospheres – Part 6: Equipment Protection by Oil Immersion 'o'"	o
	ANSI/UL 60079-7, "Explosive Atmospheres – Part 7: Equipment Protection by Increased Safety 'e'"	e
	ANSI/UL 60079-11, "Explosive Atmospheres – Part 11: Equipment Protection by Intrinsic Safety 'i'"	ib
	ANSI/UL 60079-18, "Explosive Atmospheres – Part 18: Equipment Protection by Encapsulation 'm'"	mb
Zone 2	ANSI/ISA-60079-2 (12.04.01), "Explosive Atmospheres – Part 2: Equipment Protection by Pressurized Enclosures 'p'"	pz
	ANSI/UL 60079-11, "Explosive Atmospheres – Part 11: Equipment Protection by Intrinsic Safety 'i'"	ic
	ANSI/UL 60079-15, "Electrical Apparatus for Explosive Gas Atmospheres – Part 15: Construction, Test and Marking of Type of Protection 'n' Electrical Apparatus"	nA, nC, nL, nR
Unclassified	ANSI/UL 60079-11, "Explosive Atmospheres – Part 11: Equipment Protection by Intrinsic Safety 'i'"	[ia]
	ANSI/UL 60079-11, "Explosive Atmospheres – Part 11: Equipment Protection by Intrinsic Safety 'i'"	[ib]

The basic hazardous (classified) locations standards used to investigate these products with respect to the risk of explosion for Zone 20, 21 and 22 are referenced below for the location classifications and protection techniques shown. Note that for all equipment ANSI/ISA-61241-0 (12.10.02), "Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – General Requirements," is also used.

EQUIPMENT FOR USE IN AND RELATING TO ZONE CLASSIFIED HAZARDOUS LOCATIONS (AANZ)

Location Classification	Standard	Protection Technique Identification
Zone 20	ANSI/ISA-61241-11 (12.10.06), "Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Intrinsic Safety 'iD'"	ia, iaD
	ANSI/ISA-61241-18 (12.10.07), "Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Encapsulation 'mD'"	ma, maD
	ANSI/ISA-60079-31 (12.12.03), "Explosive Atmospheres – Part 31: Equipment Dust Ignition Protection by Enclosure 't'"	ta
	ANSI/ISA-61241-11 (12.10.06), "Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Intrinsic Safety 'iD'"	ib, ibD
Zone 21	ANSI/ISA-61241-18 (12.10.07), "Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Encapsulation 'mD'"	mb, mbD
	ANSI/ISA-61241-1 (12.10.03), "Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Enclosures 'tD'"	tD
	ANSI/ISA-60079-31 (12.12.03), "Explosive Atmospheres – Part 31: Equipment Dust Ignition Protection by Enclosure 't'"	tb
	ANSI/ISA-61241-2 (12.10.04), "Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Pressurization 'pD'"	p, pb, pD

EQUIPMENT FOR USE IN AND RELATING TO ZONE CLASSIFIED HAZARDOUS LOCATIONS (AANZ)

Location Classification	Standard	Protection Technique Identification
Zone 22	ANSI/ISA-61241-1 (12.10.03), "Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Enclosures 'tD'"	tD
	ANSI/ISA-60079-31 (12.12.03), "Explosive Atmospheres – Part 31: Equipment Dust Ignition Protection by Enclosure 't'"	tc
	ANSI/ISA-61241-2 (12.10.04), "Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Pressurization 'pD'"	pD
	ANSI/ISA-61241-11 (12.10.06), "Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Intrinsic Safety 'iD'"	[ia], [iaD]
Unclassified	ANSI/ISA-61241-11 (12.10.06), "Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Intrinsic Safety 'iD'"	[ib], [ibD]
	ANSI/ISA-61241-11 (12.10.06), "Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Intrinsic Safety 'iD'"	

PRODUCT CATEGORIES BY CATEGORY CODE

The basic unclassified locations standard used to investigate these products with respect to risk of fire and electric shock is ANSI/UL 508, "Industrial Control Equipment," unless otherwise specified in the general Guide Information for each product category.

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

GLOBAL POSITIONING SYSTEMS

If provided as part of the equipment, global positioning system (GPS) and/or enhanced 911 (E911) hardware, GPS and/or E911 operating software, or other GPS-related and/or E911-related aspects of equipment have not been investigated for performance or reliability. The equipment has only been investigated for the explosion, fire, shock and casualty hazards required by the applicable hazardous (classified) locations standards. Certification of the equipment does not cover the performance or reliability of any GPS and/or E911 hardware, GPS and/or E911 operating software, or other GPS-related and/or E911-related aspects of the equipment. **UL makes no representations, warranties or certifications whatsoever regarding the performance or reliability of any GPS-related and/or E911-related functions of the equipment.**

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

MARINE EQUIPMENT

Certain equipment has been specifically investigated and certified for use aboard marine vessels. Such equipment has been investigated in accordance with the applicable requirements of UL, the United States Coast Guard (USCG), the American Boat and Yacht Council, Inc. (ABYC), and the National Fire Protection Association (NFPA). For additional information, see the general Guide Information for the specific product category. Equipment bearing UL's Marine Mark is suitable for use only with stranded copper wire.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PLUMBING AND ASSOCIATED PRODUCTS (AAPP)

GENERAL

Plumbing products include plumbing fixtures, fixture fittings, pipe and fittings, and appliances, as well as accessories associated with such equipment.

This equipment is intended for use only as described in the general Guide Information for each product category and individual Listings. This equipment has only been investigated for use as described in the instructions and markings provided with the equipment. The use of the equipment in conditions other than described in the instructions, markings and the general Guide Information for the applicable product category has not been investigated by UL.

INVESTIGATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association (NFPA), and applicable model codes identified in the general Guide Information for each product category.

In addition, certain products have been investigated with reference to environmental and public health effects and for potential conformity to the installation and use provisions of applicable environmental and public health requirements, if so indicated in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are investigated for the specifications or use conditions indicated in the general Guide Information for each product category.

These products are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

INDOOR AND OUTDOOR USE

Unless outdoor use is specifically indicated in the general Guide Information for the product category or included in the individual Listings of the product, individual appliances have been investigated only for use indoors, unless the product, by its inherent nature, is obviously intended for use outdoors.

ELECTRICAL INSTALLATIONS

General — The ampere or wattage marking on electrical power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to electric heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Supply Conductors — Except as noted in the general Guide Information for some product categories, most terminals are for use only with copper wire unless marked otherwise. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted below or in the general Guide Information for certain product categories, the electrical termination provisions on equipment are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in higher rated circuits.

If the electrical termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75 or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) specified in Table 310.16 of ANSI/NFPA 70, "National Electrical Code" (NEC), should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

Terminations — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Supply terminals of 15 A and 20 A switches and receptacles not marked "CO/ALR" are for use with copper and copper-clad aluminum conductors only. Terminals marked "CO/ALR" are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked "AL/CU" are for use with copper conductors only. Terminals of switches rated 30 A and above marked "AL/CU" are for use with aluminum, copper and copper-clad aluminum conductors.

Combination of dissimilar conductors in terminal or splicing connectors is acceptable only in dry locations and when the connectors are identified as suitable for such intermixing.

Hazardous Locations — Electrical equipment and appliances are not intended for use in hazardous (classified) locations, as defined in the NEC, unless specifically identified as suitable for use in hazardous locations.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FLAMMABLE AND COMBUSTIBLE LIQUIDS AND GASES EQUIPMENT (AAPQ)

GENERAL

This equipment is intended for the storing, containing, conveying, dispensing, regulating or use of flammable and combustible gases, liquids or waste materials. This equipment also includes chemical products that are Classified with respect to fire hazard.

This equipment is intended for use only with the liquids and gases described in the general Guide Information for each product category and individual Listings. This equipment has only been investigated for use as described in the instructions and markings provided with the equipment. The use of the equipment with other liquids and gases, and in conditions other than described in the instructions, markings and the general Guide Information for the applicable product category, has not been investigated by UL.

INVESTIGATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association (NFPA), and applicable model codes identified in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are investigated for the specifications or use conditions indicated in the general Guide Information for each product category.

These products are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

INDOOR AND OUTDOOR USE

Unless outdoor use is specifically indicated in the general Guide Information for the product category or included in the individual Listings of

the product, individual appliances have been investigated only for use indoors, unless the product, by its inherent nature, is obviously intended for use outdoors.

ELECTRICAL INSTALLATIONS

General — The ampere or wattage marking on electrical power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to electric heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Supply Conductors — Except as noted in the general Guide Information for some product categories, most terminals are for use only with copper wire unless marked otherwise. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted below or in the general Guide Information for certain product categories, the electrical termination provisions on equipment are based on the use of 60°C insulated conductors in circuits rated 100 A or less and the use of 75°C insulated conductors in higher rated circuits.

If the electrical termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75 or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) specified in Table 310.16 of ANSI/NFPA 70, "National Electrical Code" (NEC), should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

Terminations — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Supply terminals of 15 A and 20 A switches and receptacles not marked "CO/ALR" are for use with copper and copper-clad aluminum conductors only. Terminals marked "CO/ALR" are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked "AL/CU" are for use with copper conductors only. Terminals of switches rated 30 A and above marked "AL/CU" are for use with aluminum, copper and copper-clad aluminum conductors.

Combination of dissimilar conductors in terminal or splicing connectors are acceptable only in dry locations and when the connectors are identified as suitable for such intermixing.

Hazardous Locations — Electrical equipment and appliances are not intended for use in hazardous (classified) locations, as defined in the NEC, unless specifically identified as suitable for use in hazardous locations.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ACCESS CONTROL SYSTEM UNITS FOR USE IN HAZARDOUS LOCATIONS (AATF)

USE

This category covers units for access control systems, providing a means of regulating or controlling entry into an area, or access to or the use of a device by electrical, electronic and/or mechanical means.

Intrinsically safe systems covered under this category have been investigated on the basis that all equipment connected to the system is certified as part of the system unless otherwise indicated and is used as intended.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

ACCESS CONTROL SYSTEM UNITS FOR USE IN HAZARDOUS LOCATIONS (AATF)

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 294, "Access Control System Units."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AALZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Access Control System Unit for Hazardous Locations," "Access Control System (Associated Apparatus)" or "Access Control System Unit (Associated Apparatus)," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ADVERTISING DISPLAYS, NONILLUMINATED (AAVU)

USE

This category covers electrically operated, nonilluminated units intended to draw attention to, or to display, demonstrate or advertise products.

Advertising displays intended for permanent installation indoors only are so marked. Cord-and-plug-connected advertising displays suitable for outdoor use are marked "Outdoor."

RELATED PRODUCTS

Advertising displays including illumination are covered under Signs (UXYT).

Advertising displays that include a changing-message sign are covered under Signs (UXYT) and Signs, Changing Message (UYFS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 48, "Electric Signs," and ANSI/UL 73, "Motor-Operated Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Advertising Display," "Non-Illuminated Advertising Display" or "Animated Display," or other appropriate product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AIR CONDITIONING EQUIPMENT (AAYZ)

ACCESSORIES, AIR CONDITIONING EQUIPMENT (ABFY)

GENERAL

This category covers accessories intended for installation only on certified equipment as designated in the individual certifications of the equipment and accessory. These accessories are intended primarily for field installation, but may be factory installed.

The equipment on which an accessory covered under this category may be field installed is marked to indicate that it is certified for use with the specific accessory as designated by model, catalog number, part number, etc. in this category. Markings on the equipment also indicate any changes in the equipment ratings with the accessory installed.

Information concerning field wiring connections, mounting location, installation clearances, etc., are marked on the accessory, and/or in detailed installation instructions accompanying each accessory. For permanently con-

AIR CONDITIONING EQUIPMENT (AAYZ)

Accessories, Air Conditioning Equipment (ABFY)—Continued

nected equipment, the wiring termination provisions are based on tests during product investigation, and Table 310.16 of ANSI/NFPA 70, "National Electrical Code," as follows:

1. 75°C insulated conductors at the 75°C ampacities.
2. 90°C insulated conductors at the 75°C ampacities, in which case the equipment is marked for 90°C conductors.
3. Insulation temperature rating of 75 or 90°C and wire size as marked on the unit.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1995, "Heating and Cooling Equipment."

Alternatively, single-phase appliances rated not more than 250 V, and all other appliances rated not more than 600 V are investigated to ANSI/UL 60335-1, "Safety of Household and Similar Electrical Appliances, Part 1: General Requirements," and ANSI/UL 60335-2-40, "Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Air Conditioning Equipment Accessory."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ACCESSORIES, AIR-DUCT MOUNTED (ABQK)

USE AND INSTALLATION

This category covers products employing ultraviolet lamps or ionization tubes for the purpose of treating air and having provisions for connection to heating and ventilation ducts used for air distribution.

This equipment is rated 600 V ac or less and is intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code." Equipment to be connected to an air-duct system is additionally intended for installation in accordance with ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," or ANSI/NFPA 90B, "Installation of Warm Air Heating and Air-Conditioning Systems."

This equipment is suitable for rigid sheet-metal air ducts only. Installation should be such that the structural integrity of the duct is not compromised.

Equipment employing ionization tubes is not intended for installation downstream from a humidifier or where similar exposure to other sources of moisture is likely.

PRODUCT MARKINGS

Information concerning wiring connections, mounting location, installation clearances, etc., are either marked on the accessory and/or in detailed installation instructions accompanying each accessory.

Products intended for use with germicidal lamps are marked "This product (fixture) is designed for use with germicidal lamps and must be installed in compliance with competent technical directions so that the user's eye and bare skin will not be subjected to ultraviolet rays."

FACTORS NOT INVESTIGATED

The health aspects associated with the use of these products and their ability to aid in disinfection of environmental air have not been investigated. This limitation is specified in the instruction manual and on the product for all products covered under this category.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standards used to investigate products employing ultraviolet lamps in this category are ANSI/UL 153, "Portable Electric Luminaires," ANSI/UL 1598, "Luminaires," and ANSI/UL 1995, "Heating and Cooling Equipment."

The basic standards used to investigate products employing ionization tubes in this category are ANSI/UL 1995 and ANSI/UL 867, "Electrostatic Air Cleaners."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and

Accessories, Air-duct Mounted (ABQK)—Continued

Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**AIR DUCT MOUNTED ACCESSORY
WITH RESPECT TO ELECTRIC SHOCK, FIRE AND CASUALTY
HAZARDS ONLY
Control No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**AIR CONDITIONERS, PACKAGED
TERMINAL (ACKZ)**

GENERAL

This category covers packaged terminal air conditioners and packaged terminal heat pumps. They consist of a wall sleeve, outdoor louvers, and a combination of assemblies designed as a unit and intended for mounting through the wall. They include refrigeration components as the prime source of cooling and dehumidification. They may also have provision for heating by hot water, reverse cycle refrigeration, steam, electric resistance heat or gas-fired burner(s). These units employ alternating current, hermetic refrigerant motor compressors with factory charged refrigeration systems and include a means for ventilation and circulating air. Accessories intended for use with packaged terminal air conditioners are also covered under this category.

This category does not cover equipment intended for connection to duct systems for the purpose of providing central cooling and/or heating.

INSTALLATION

This equipment is rated 600 V or less and intended to be installed in accordance with the requirements of ANSI/NFPA 70, "National Electrical Code." It is intended for installation through walls and basically intended to serve a single room, zone or space, although some units may have provision to additionally serve an adjacent room.

Permanently connected units are intended to be connected to a branch circuit protected by overcurrent devices that do not exceed the value marked on the data plate or attached wiring diagram. This marked protective device rating is the maximum for which the unit has been investigated and found acceptable. If the marking specifies fuses, the unit is intended to be protected by fuses only. If time-delay fuses are required for restarting, the unit is so marked.

Units employing gas heat are intended to be installed in accordance with the installation instructions and markings on the appliance, and are intended to be connected to a gas supply of the type specified on the appliance. Equipment is intended to be installed in accordance with the current edition of ANSI Z223.1/NFPA 54, "National Fuel Gas Code."

PRODUCT MARKINGS

Cord-connected units that require a circuit breaker or time-delay fuses to permit restarting are so marked.

Units with water cooled condensers investigated for connection to ground water sources are so marked.

Some equipment may be designed to accept accessories in the field. In such cases, both the air conditioner and the accessory are marked to relate the two for proper installation.

This equipment typically consists of multiple assemblies or sections that are shipped in separate packages to be assembled in the field. The sections are marked to relate to one another for proper installation. The section incorporating the primary nameplate contains an essential elements label that details the other sections needed to complete the installation.

FACTORS NOT INVESTIGATED

The effect of these units on the fire resistance rating of the wall has not been investigated.

RELATED PRODUCTS

See Air Conditioners, Room (ACOT) and Gas-fired Room Heaters, Vented (LPNH). Air conditioners for spot cooling or environmental control of electronic enclosures are covered under Air Conditioners, Special Purpose (ACVS). Dehumidifiers are covered under Dehumidifiers, Refrigeration Type (AFFT). Air conditioning equipment designed for duct connection to multiple rooms is covered under Heating and Cooling Equipment (LZFE).

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate the refrigeration and heating (other than gas) portions of the products in this category is ANSI/UL 484,

Air Conditioners, Packaged Terminal (ACKZ)—Continued

"Room Air Conditioners," or ANSI/UL 60335-1, "Safety of Household and Similar Electrical Appliances, Part 1: General Requirements," and ANSI/UL 60335-2-40, "Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers."

The basic standard used to investigate the gas heating portion of the products in this category, if provided, is the current edition and effective addenda thereto of ANSI Z21.86/CSA 2.32, "Vented Gas-Fired Space Heating Appliances."

UL MARK

The Listing Mark and Gas-fired Listing Mark, if gas heat is provided, of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Packaged Terminal Air Conditioner," "Packaged Terminal Heat Pump," "Section of Packaged Terminal Air Conditioner," "Cooling Portion of Packaged Terminal Air Conditioner" or "Accessory for Packaged Terminal Air Conditioner."

The Gas-fired Listing Mark for the gas heating portion of these products, if provided, includes the UL symbol with the words "GAS-FIRED" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, the product name "Gas Heating Portion of Packaged Terminal Air Conditioner," and the standard designation "ANS Z21.86(+) CSA-2.32(+)(++) Fan-Type Direct Vent Wall Furnace."

(+) Suffix letter of latest addendum if applicable

(++) Issue year of latest addendum or standard

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AIR CONDITIONERS, ROOM (ACOT)

GENERAL

This category covers room air conditioners and recreational vehicle (RV) air conditioners. They are encased assemblies designed as a unit and intended as the prime source of cooling and dehumidification, intended to serve a single room, zone or space. These products may be self-contained or split-system. Accessories intended for use with room air conditioners are also covered under this category.

INSTALLATION

This equipment is rated 600 V ac or less and is intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

Room air conditioners are intended for installation in windows, through walls, or as consoles located in or adjacent to the room, zone, or space to be conditioned. They may also be split-system, where the evaporator section is installed inside, and the condensing unit is installed outside. The two sections are connected by refrigerant piping and electrical wiring.

A console or in-wall-type room air conditioner may have provision to additionally serve a single adjacent room.

Split-system room air conditioners are designed for field interconnection with a matching section. Such units and sections are marked to relate the two for proper installation. The sections may be shipped separately.

RV air conditioners are intended for roof-top or underfloor mounting as indicated in the installation instructions, and are intended only for permanent connection to the source of electrical supply.

These units employ hermetic refrigerant motor-compressors with factory-charged refrigeration systems and include a means for circulating air. They may also have provision for electric heating, reverse cycle heating, and ventilation. Room air conditioners are not intended for connection to duct systems for the purpose of providing central cooling and/or heating. RV air conditioners may be ducted to remote areas of the vehicle as specified in the installation instructions, which include the minimum duct size, maximum length, and minimum register size.

Permanently connected units are intended to be connected to a branch circuit protected by overcurrent devices that do not exceed the value marked on the data plate or attached wiring diagram. This marked protective device rating is the maximum for which the unit has been investigated and found acceptable. If the marking specifies fuses, the unit is intended to be protected by fuses only. If time-delay fuses are required for restarting, the unit is so marked.

Cord-connected room air conditioners are provided with instructions regarding the use of extension cords. If the use of an extension cord is not recommended, the instructions state this. Recommendations for an extension cord specify the use of a cord set with an equipment grounding con-

Air Conditioners, Room (ACOT)—Continued

ductor, grounding-type attachment plug and grounding-type connector, and the ampacity and voltage rating of the cord set.

The U.S. Environmental Protection Agency's Significant New Alternatives Policy (SNAP) Program requirements should be consulted for room air conditioners in this category that employ a flammable refrigerant (ASHRAE 34 Class A2, A2L or A3). Authorities Having Jurisdiction should also be consulted for any additional requirements.

PRODUCT MARKINGS

Cord-connected units that require circuit breakers or time-delay fuses to permit restarting are so marked.

Units with water-cooled condensers investigated for connection to ground water sources are so marked.

Some equipment may be designed to accept accessories installed in the field. In such cases, both the room air conditioner and the accessory are marked to relate the two for proper installation.

If parts or sections of the room air conditioner are separately shipped from the factory, they are marked to relate the sections to one another for proper installation.

RELATED PRODUCTS

Packaged terminal air conditioners are covered under Air Conditioners, Packaged Terminal (ACKZ).

Air conditioners for spot cooling or environmental control of electronic enclosures are covered under Air Conditioners, Special Purpose (ACVS).

Dehumidifiers are covered under Dehumidifiers, Refrigeration Type (AFFI).

Products Verified for energy efficiency are covered under Air Conditioners, Room Verified for Energy Efficiency (ZWAI).

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 484, "Room Air Conditioners."

Split-system air conditioners may be investigated to ANSI/UL 1995, "Heating and Cooling Equipment."

Alternatively, the basic standards used to investigate products in this category are ANSI/UL 60335-1, "Safety of Household and Similar Electrical Appliances, Part 1: General Requirements," and ANSI/UL 60335-2-40, "Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Room Air Conditioner," "Split System Air Conditioner," "Split Type Air Conditioner," "Section of Room Air Conditioner" or "Accessory for Room Air Conditioner."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AIR CONDITIONERS, SPECIAL PURPOSE (ACVS)**GENERAL**

This category covers equipment designed for special purposes, such as portable spot cooling, environmental control of electronic enclosures, or supplementary cooling of computer rooms or computer equipment. These products may be self-contained or sectional, and are designed to provide conditioned air to a single room or space. Accessories are also covered under this category.

INSTALLATION

This equipment is rated 600 V or less and is intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

This equipment consists of one or more factory-made sections. If the equipment is provided in two or more sections, each such section is designed for field interconnection with a matched section(s) to make the air conditioner assembly. Unless so indicated in the individual certifications, the evaporator blower is provided as part of the assembly, and may be an integral part of the evaporator section or furnished as a separate section. The individual certifications show the distinctive designation of each section comprising the assembly.

The proper method of electrical installation (number of branch circuits, disconnects, etc.) is shown on the wiring diagram and/or marking required to be attached to the unit.

Air Conditioners, Special Purpose (ACVS)—Continued

In permanently connected units employing two or more motors or a motor(s) and other loads, operating from a single supply circuit, the motor overload protective devices (including thermal protectors for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of compliance with the motor branch circuit short-circuit and ground-fault protection requirements of Section 430.53(C) of the NEC. Such multimotor and combination load equipment is intended to be connected only to a circuit protected by fuses or circuit breakers with a rating that does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable.

Accessories for special purpose air conditioners are provided with instructions for installation into the product.

Units suitable for use with certified field-installed accessories, such as electric resistance heaters, are specifically indicated in the individual certifications.

The U.S. Environmental Protection Agency's Significant New Alternatives Policy (SNAP) Program requirements should be consulted for special-purpose air conditioners in this category that employ a flammable refrigerant (ASHRAE 34 Class A2, A2L or A3). Authorities Having Jurisdiction should also be consulted for any additional requirements.

PRODUCT MARKINGS

Units suitable for outdoor installation are so marked. Units not marked as suitable for outdoor installation are for indoor use only.

Some equipment is designed to accept accessories installed in the field. In such cases, both the air conditioner and the accessory are marked to relate the two for proper installation.

Where a clearance is required to be maintained to combustible construction, the minimum clearance is designated in the individual certifications and is also marked on the unit. Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet-metal ducts and plenum attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, ducts, and plenum.

RELATED PRODUCTS

See Air Conditioners, Room (ACOT), Air Conditioners, Packaged Terminal (ACKZ), Dehumidifiers, Refrigeration Type (AFFI) and Heating and Cooling Equipment (LZFE).

Equipment without a refrigeration system is covered under Heating and Cooling Equipment (LZFE).

Permanently connected computer room air conditioners are covered under Heating and Cooling Equipment (LZFE).

ADDITIONAL INFORMATION

For additional information, see Air Conditioning Equipment (AAYZ), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 484, "Room Air Conditioners," or ANSI/UL 60335-1, "Safety of Household and Similar Electrical Appliances, Part 1: General Requirements," and ANSI/UL 60335-2-40, "Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Special Purpose Air Conditioner," "Section of Special Purpose Air Conditioner" or "Accessory for Special Purpose Air Conditioner," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PACKAGED TERMINAL AIR CONDITIONERS, REPLACEMENT (ADAU)**GENERAL**

This category covers replacement packaged terminal air conditioner and replacement packaged terminal heat pump chassis investigated for field installation with existing wall sleeves, louvers, and panels as marked on the unit. They are rated 600 V or less and intended as the prime source of air conditioning and dehumidification.

These units may also have provision for heating by hot water, reverse-cycle refrigeration, steam or electric resistance elements. They employ alter-

Packaged Terminal Air Conditioners, Replacement (ADAU)—Continued

nating current, hermetic refrigerant motor-compressors with factory-charged refrigeration systems, and include a means for ventilating and circulating air.

INSTALLATION

This equipment is intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," and is intended for installation through walls and to serve a single room, zone or space, although some units may have provision to additionally serve an adjacent room.

Permanently connected units are intended to be connected to a branch circuit protected by overcurrent devices that do not exceed the value marked on the data plate or attached wiring diagram. This marked protective device rating is the maximum for which the unit has been investigated and found acceptable. If the marking specifies fuses, the unit is intended to be protected by fuses only. If time-delay fuses are required for restarting, the unit is so marked.

PRODUCT MARKINGS

Cord-connected units requiring a circuit breaker or time-delay fuses to permit restarting are so marked.

Units are marked to indicate the existing wall sleeves, louvers and panels with which they are to be used and field installed.

RELATED PRODUCTS

Room air conditioners are covered under Air Conditioners, Room (ACOT).

Air conditioners intended for spot cooling or environmental control of electronic enclosures are covered under Air Conditioners, Special Purpose (ACVS).

Dehumidifiers are covered under Dehumidifiers, Refrigeration Type (AFFT).

Air-conditioning equipment designed for connection to duct systems for the purpose of providing central cooling and/or heating is covered under Heating and Cooling Equipment (LZFB).

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 484, "Room Air Conditioners."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

REPLACEMENT PACKAGED TERMINAL AIR CONDITIONER FOR FIELD INSTALLATION WITH EXISTING WALL SLEEVES, OUTDOOR LOUVERS,

AND INDOOR PANELS AS SPECIFIED ON THE PRODUCT AS TO ELECTRIC SHOCK, FIRE AND CASUALTY HAZARDS ONLY
Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AIR FILTERING APPLIANCES (AEDX)

GENERAL

This category covers portable and stationary air-filtering appliances intended for window, floor, table and similar mounting. This category also covers fixed air-filtering appliances intended for permanent mounting to walls, ceilings, and similar applications. The appliances consist primarily of air-circulating fans and mechanical filters, but may additionally employ ultraviolet/germicidal lamps.

PRODUCT MARKINGS

Appliances specifically investigated for use in "other spaces used for environmental air," per Article 300.22(c) of ANSI/NFPA 70 (2002), "National Electrical Code," are marked "These units evaluated for use in other spaces for environmental air per National Electrical Code Article 300.22(c)(2)."

FACTORS NOT INVESTIGATED

The physiological effects of the operation of these appliances, beneficial or otherwise, have not been investigated.

RELATED PRODUCTS

Appliances not provided with filters and intended for circulating air in a room are covered under Fans, Ceiling Suspended (GPRT) and Fans, Electric (GPVV).

Air Filtering Appliances (AEDX)—Continued

Electrostatic air cleaners and fans employing electrostatic air cleaners are covered under Electrostatic Air Cleaners (AGGZ).

Ionizers, fans employing ionizers, and ion generators are covered under Ion Generators (OETX).

Deodorizers intended to remove odors in specific applications by ozone generation are covered under Deodorizers, Ozone Generator Type (EOKL).

Deodorizers intended to be used in treating air by dispersal of chemicals or by scenting the air are covered under Deodorizers and Air Fresheners (EOGX).

Appliances employing ultraviolet lamps or ionization tubes for the purpose of treating air and having provisions for connection to heating and ventilation ducts used for air distribution are covered under Accessories, Air Duct Mounted (ABQK).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 507, "Electric Fans."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Air Filtering Appliance" or "Air Filter," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DEHUMIDIFIERS, REFRIGERATION TYPE (AFFT)

GENERAL

This category covers portable, self-contained household, commercial and industrial dehumidifiers for use in removing moisture from the air. These dehumidifiers are designed for cord connection to single-phase, alternating-current circuits rated not more than 20 A, 125 V or 15 A, 208 or 230 V. They employ hermetic refrigerant motor-compressors and may also incorporate electric air heaters.

These dehumidifiers are intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code."

RELATED PRODUCTS

Air conditioners intended for spot cooling are covered under Air Conditioners, Special Purpose (ACVS).

Desiccant-type dehumidifiers with a heater are covered under Heaters, Specialty (KSOT).

Duct-mounted and permanently connected dehumidifiers are covered under Heating and Cooling Equipment (LZFE).

See Air Conditioners, Room (ACOT).

Products Verified for energy efficiency are covered under Dehumidifiers, Refrigeration Type Verified for Energy Efficiency (ZWHP).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 474, "Dehumidifiers," or ANSI/UL 60335-1, "Safety of Household and Similar Electrical Appliances, Part 1: General Requirements," and ANSI/UL 60335-2-40, "Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Dehumidifier" for a household unit, or "Special Purpose Dehumidifier" for a commercial or industrial unit.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Dehumidifiers, Refrigeration Type (AFFT)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTROSTATIC AIR CLEANERS (AGGZ)**GENERAL**

This category covers duct type, room type (fixed), stationary and portable electrostatic air cleaners intended to remove airborne dust particles and the like.

This category also covers accessories intended for field installation on specific certified electrostatic air cleaners. They are marked to indicate the associated certified equipment by model, catalog number, part number, or other identifier as appropriate. Markings on the equipment also indicate any changes in the equipment ratings with the accessory installed. Information concerning field wiring connections, mounting location, installation clearances, etc., are marked on the accessory, and/or in detailed installation instructions accompanying each accessory.

Duct-type electrostatic air cleaners are intended for installation in and adjoining heating air conditioning and ventilating ducts in accordance with ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," and ANSI/NFPA 90B, "Installation of Warm Air Heating and Air-Conditioning Systems."

Duct-type electrostatic air cleaners that may be used in exhaust systems of restaurant-type cooking equipment are so marked. These air cleaners are intended for installation in accordance with ANSI/NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations." When installed in accordance with ANSI/NFPA 96, a certified grease filter or extractor must be installed ahead of the air cleaner.

Room-type electrostatic air cleaners are self-contained units; the fixed types are intended for permanent installation. Portable or stationary types are cord connected.

Electrostatic air cleaners are intended for use where removal of dust and dirt from equipment is frequent enough to prevent excessive accumulation, which may result in flashover and fire damage. The instructions and warnings supplied with and on each piece of equipment should be carefully observed.

Electrostatic air cleaners have either Class 1 or Class 2 filters or adhesive-coated ionizer collector cells as follows:

Class 1 filters or adhesive-coated ionizer collector cells are those which, when clean, do not contribute fuel when attacked by flame and which emit only negligible amounts of smoke.

Class 2 filters or adhesive-coated ionizer collector cells are those which, when clean, burn moderately when attacked by flame or emit moderate amounts of smoke, or both.

Electrostatic air cleaners designed to be assembled together in the field from component parts are Listed by Report. Under this form of certification, a Report is prepared that identifies and describes the complete assembly and includes instructions for proper installation. Copies of the report are available from the Listee.

REBUILT PRODUCTS

This category also covers electrostatic air cleaners that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt electrostatic air cleaners are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt electrostatic air cleaners are subject to the same requirements as new electrostatic air cleaners.

FACTORS NOT INVESTIGATED

The physiological effects of the operation of these appliances, beneficial or otherwise, have not been investigated.

RELATED PRODUCTS

Ionizers, fans employing ionizers, and ion generators are covered under Ion Generators (OETX).

Air-filtering appliances utilizing mechanical filtration only or ultraviolet/germicidal lamps are covered under Air-filtering Appliances (AEDX).

Deodorizers intended to be used in treating air by dispersal of chemicals or by scenting the air are covered under Deodorizers and Air Fresheners (EOGX).

Deodorizers intended to remove odors in specific applications by ozone generation are covered under Deodorizers, Ozone Generator Type (EOKL).

Appliances employing ultraviolet lamps or ionization tubes for the purpose of treating air and having provisions for connection to heating and ventilation ducts used for air distribution are covered under Accessories, Air Duct Mounted (ABQK).

Power supplies intended for use in electrostatic air-cleaning equipment are covered under Power Supplies, Electrostatic Air-cleaning Equipment (QQCH2).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

Electrostatic Air Cleaners (AGGZ)—Continued

The basic standard used to investigate products in this category is ANSI/UL 867, "Electrostatic Air Cleaners."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrostatic Air Cleaner" or "Electrostatic Air Cleaner Accessory."

For rebuilt products, the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EVAPORATIVE COOLER RETROFIT PUMPS (AGIS)**USE AND INSTALLATION**

This category covers pumps intended to replace the original pumps provided in certified evaporative coolers and pumps meant as retrofit pumps providing additional functionality, such as the timed purging of evaporative-cooler reservoirs. They do not require qualified service personnel for installation when the evaporative cooler is provided with a receptacle intended for cord-and-plug connection of the pump. For installations where the pump is not provided with a plug or where the plug must be cut off in order to wire the pump directly into the cooler circuitry, installation by qualified service personnel is specified. Pump construction, performance and installation instructions have been investigated to determine that, when properly installed, they comply with the requirements applied to original equipment pumps in these coolers.

PRODUCT MARKINGS

The pump packaging indicates the brand name, models or ratings of the evaporative coolers for which the pump is designed. Information concerning mounting of the pump, cord routing, maximum depth of water in the reservoir, and regular testing of any GFCI protecting the pump is either marked on the pump packaging or provided in detailed installation instructions accompanying each pump.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 778, "Motor-Operated Water Pumps," and ANSI/UL 507, "Electric Fans."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

EVAPORATIVE COOLER RETROFIT PUMP FOR USE WITH SPECIFIED EVAPORATIVE COOLERS ONLY**Control No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EVAPORATIVE COOLERS (AGNY)**USE AND INSTALLATION**

This category covers evaporative coolers of portable, window and stationary types for residential, commercial and industrial applications. Stationary types may have provision for connection to a duct system for air distribution. Models investigated for outdoor installation are marked "Outdoor Use."

Motors used in stationary equipment intended for duct system connection are prevented from hazardous overheating by inherent overheating devices, by overcurrent protective devices, or by impedance of the motor windings.

Units permanently connected to the source of supply are intended to be installed in accordance with the requirements of ANSI/NFPA 70, "National Electrical Code."

Evaporative media provided on stationary units that are intended for connection to a duct system in accordance with the "International Mechanical

Evaporative Coolers (AGNY)—Continued

Code,” ANSI/NFPA 90A, “Installation of Air Conditioning and Ventilating Systems,” or ANSI/NFPA 90B, “Installation of Warm Air Heating and Air Conditioning Systems,” are investigated in accordance with UL 900, “Air Filter Units.” These products are also suitable for installation in accordance with the “Uniform Mechanical Code.”

RELATED PRODUCTS

Some stationary, duct-connected evaporative coolers are covered under Evaporative Coolers Certified in Accordance with the Uniform Mechanical Code (AGOS).

Air coolers that include a motor compressor and refrigeration system are covered under Room Air Conditioners (ACOT).

Products intended primarily for circulating moistened air are covered under Humidifiers (AHIV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 507, “Electric Fans.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Evaporative Cooler” or “Evaporative Air Cooler.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connect

HUMIDIFIERS (AHIV)

GENERAL

This category covers humidifiers intended for residential and commercial applications that circulate moistened air and generally incorporate an air-circulating fan with or without filters. Stationary types may have provision for connection to heating and ventilating ducts for air distribution.

Motors used in stationary equipment intended for duct connection are prevented from hazardous overheating by inherent overheating devices, overcurrent protective devices, or inherent impedance. Impedance-protected motors do not generate smoke during locked-rotor testing.

RELATED PRODUCTS

Evaporative coolers are covered under Evaporative Coolers (AGNY) and Evaporative Coolers Certified in Accordance with the Uniform Mechanical Code (AGOS).

Vaporizers are covered under Vaporizers (YEIV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 998, “Humidifiers.”

The basic standard used to investigate air filters provided on stationary-type humidifiers in this category is ANSI/UL 900, “Air Filter Units.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Humidifier.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

THERMAL AISLE CONTAINMENT SYSTEMS (AHJG)

GENERAL

This category covers thermal aisle containment systems, an HVAC method deployed in the occupied area of an air-cooled ITE space utilizing physical separation of hot exhaust air from cooler intake air between equipment cabinets, rows of ITE, or associated power and cooling infrastructure. Containment is typically above, and at both ends of a hot aisle

Thermal Aisle Containment Systems (AHJG)—Continued

or cold aisle, in whole or in part. Dropout ceilings for use beneath automatic sprinklers may be employed along with any necessary power supplies and/or other electrical devices and hardware.

This category also covers accessories intended for use with thermal aisle containment systems.

INSTALLATION

This equipment is rated 600 V or less and is intended for installation in accordance with ANSI/NFPA 75, “Fire Protection of Information Technology Equipment,” and ANSI/NFPA 70, “National Electrical Code” (NEC), including Article 645, “Information Technology Equipment.”

A thermal aisle containment system may be shipped from the factory unassembled, or disassembled to the degree necessary to facilitate shipment. In some cases, subassemblies may be shipped separately for final assembly at the installation site. In these cases, the following apply:

1. All of the parts are furnished or specified by the manufacturer.
2. The specific location of the assemblies in the thermal aisle containment system and their method of installation are predetermined by the manufacturer and are not dependent upon the installation personnel.
3. Electrical connections used to connect the field-installed components are accomplished by means of plugs and receptacles, wiring terminations, or other means that are in compliance with the NEC.
4. Detailed step-by-step installation instructions are provided in the form of installation instructions or a detailed installation practice.
5. Parts and subassemblies are marked with the manufacturer’s name or logo, and a part number (P/N) or other type designation. These parts and subassemblies are identified in an “essential elements” label located on one central part of the system.

The proper method of electrical installation (number of branch circuits, disconnects, control-wiring connections, etc.) is shown on the wiring diagram(s) and/or marking required to be attached to the system.

Accessories for thermal aisle containment systems are provided with instructions for installation into the product.

Units suitable for use with Listed field-installed accessories are specifically indicated in the individual Listings.

The installation and arrangement of the thermal aisle containment system should not interfere with exits already provided in the ITE room.

FIRE-RESISTANCE RATINGS

With reference to ANSI/NFPA 75, wall- and ceiling-panel elements of the aisle containment system are constructed of materials that have a maximum flame-spread index of 50 and a maximum smoke-developed index of 450 in accordance with ANSI/UL 723, “Test for Surface Burning Characteristics of Building Materials.”

PRODUCT MARKINGS

This equipment typically consists of multiple parts or subassemblies that are shipped separately to be assembled in the field. The parts and subassemblies are marked to relate to one another for proper installation. One of the primary subassemblies contains an “essential elements” label that details the other parts and subassemblies needed to complete the installation.

Some equipment is designed to accept accessories installed in the field. In such cases, the accessory is marked to relate the two for proper installation.

RELATED PRODUCTS

See Air Conditioners, Room (ACOT), Air Conditioners, Packaged Terminal (ACKZ), Dehumidifiers, Refrigeration Type (AFFT) and Heating and Cooling Equipment (LZFE).

Special-purpose air conditioners are covered under Air Conditioners, Special Purpose (ACVS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 484, “Room Air Conditioners,” in addition to ANSI/NFPA 75 (2012), “Fire Protection of Information Technology Equipment,” ANSI/NFPA 13 (2012), “Installation of Sprinkler Systems,” and/or Article 645 of ANSI/NFPA 70 (2011), “National Electrical Code.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Thermal Aisle Containment System,” “Section of Thermal Aisle Containment System” or “Accessory for Thermal Aisle Containment System.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Thermal Aisle Containment Systems (AHJG)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELEVATOR AND ESCALATOR SYSTEMS, SUBSYSTEMS, COMPONENTS AND FUNCTIONS (AECO)

GENERAL

This category covers elevator and escalator systems, subsystems, components and related functions investigated for conformance to ASME A17.7/CSA B44.7, "Performance-Based Safety Code for Elevators and Escalators."

Elevator and escalator systems include subsystems, components and functions investigated as complete units. Subsystems, components and functions of a system are specifically designated in the installation instructions provided with the system.

Where an elevator system is designated as a "model elevator," it is considered representative of series-produced elevators with the same design and configuration. All permitted variations between the model elevator and the installed elevators are clearly specified (with minimum and maximum values, features, etc.) in the technical documentation accompanying the Certificate of Conformance.

Continued surveillance of the manufacture of approved designs of systems, subsystems, components and functions is a part of this program. Inspections and tests of representative installations are made to determine the correctness of installation of subsystems, components and functions, wiring, quality of workmanship, operability of circuits, and maintenance.

This category does not cover the investigation of the design, construction, operation, inspection, testing, maintenance, alteration, or repair of elevator and escalator systems, subsystems, components and related functions using the conventional process of implementing ANSI/ASME A17.1/CSA B44, "Safety Code for Elevators and Escalators" (Option 1 as described in ASME A17.7/CSA B44.7).

RELATED PRODUCTS

Certain elevator and escalator products may be certified using the requirements contained in various UL Standards and/or ANSI/ASME A17.1/CSA B44. These certifications are covered under various product categories. The following is a partial list of where information can be found on these products.

Elevator control panels consisting of assemblies of equipment intended to control elevators, dumbwaiters, escalators, moving walks, inclined lifts and their associated equipment are covered under Elevator Control Panels (FQPB).

Elevator control panels intended for use in hazardous (classified) locations are covered under Elevator Control Panels for Use in Hazardous Locations (FSNA). Elevator control panels relating to hazardous (classified) locations that are intended for installation in unclassified locations are covered under Elevator Control Panels Relating to Hazardous Locations (FSSA).

Accessories and controllers intended for use in elevator applications, including elevator accessories such as push buttons, indicator lights and luminaires, and elevator controls such as power supplies (motor and door operators) are covered under Elevator Controls and Accessories (FQMW).

Elevator hoistway door interlocks and elevator hoistway door combination mechanical locks and electric contacts are covered under Elevator Door-locking Devices and Contacts (FQXZ).

Elevator door-locking devices and contacts intended for use in hazardous (classified) locations are covered under Elevator Door-locking Devices and Contacts for Use in Hazardous Locations (FSNT).

Switches intended for use with elevator system cars or shafts are covered under Elevator Switches (FRAH).

Passenger elevator car enclosures incorporating materials and equipment such as decorative panels, suspended ceilings and luminaires are covered under Passenger Elevator Car Enclosures (FRBK).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ), Mechanical Equipment and Associated Products (AAME) and Building Materials (AABM).

REQUIREMENTS

The basic standards used to investigate products in this category are: ANSI/ASME A17.1/CSA B44, "Safety Code for Elevators and Escalators"

ANSI/ASME A17.5/CSA B44.1, "Elevator and Escalator Electrical Equipment"

ASME A17.7/CSA B44.7, "Performance-Based Safety Code for Elevators and Escalators"

ISO/TS 22559-1, "Safety Requirements for Lifts (Elevators) - Part 1: Global Essential Safety Requirements (GESRs) for Lifts (Elevators)"

CERTIFICATE OF CONFORMANCE

ELEVATOR AND ESCALATOR SYSTEMS, SUBSYSTEMS, COMPONENTS AND FUNCTIONS (AECO)

The Certificate of Conformance serves as evidence that a representative sample of the elevator or escalator system, subsystem or component and related functions has been investigated for conformance to ASME A17.7/CSA B44.7.

The Certificate (and accompanying documents, if any) is intended to provide Authorities Having Jurisdiction with basic information on the requirements for installation and maintenance of an elevator or escalator system, subsystem or component and related functions for conformance to ASME A17.7/CSA B44.7.

The Certificate does not cover the final installation of the entire elevator or escalator equipment in the building or structure.

The Certificate includes:

- the name and address of the
 - manufacturer of the subsystem, component or function, and the name and address of the applicant (if other than the manufacturer), or
 - supplier whose products are the subject of the certification;
- the scope of the certification, including, as appropriate,
 - the product(s) certified, which is permitted to be identified by type or range of products. Where the certification is for a function, the product identity includes the word "Function";
 - relevant parts of ASME A17.7/CSA B44.7 (e.g., GESRs, SPs) to which each product or product type is certified, and
 - statement of compliance with ASME A17.7/CSA B44.7;
 - where the certification is for a function, the identity of all of the components, firmware, software, etc., associated with the function; and
- the effective date of the Certificate and the term (time limit), or expiration date;
- a unique Certificate number;
- critical information related to installation or maintenance and any conditions or limitations on the installation and use of the product(s).

UL MARK

In addition to the Certificate of Conformance noted above, the Classification Mark of UL also appears on the subsystem or component and is the only method provided by UL to identify subsystems or components manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY, MODEL, STYLE, etc.]
IN ACCORDANCE WITH ASME A17.7/CSA B44.7
Certificate No.

The Certificate number identifies the Certificate(s) of Conformance that contains the basic information on the use of the product in the elevator system, and the requirements for installation and maintenance of an elevator or escalator system, subsystem or component and related functions for conformance with the requirements of ASME A17.7/CSA B44.7.

If a component or subsystem is certified for use with more than one system, the Classification Mark may contain more than one Certificate number.

Where the certification is for a function, the Classification Mark appears on each of the critical parts associated with the function or on a major part of the system incorporating key components of the function (such as a control panel). The product identity includes the word "Function" (e.g., "Function Software," "Switch Override Function") and the certificate identifies all of the components, firmware, software, etc., associated with the function.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AIR CONDITIONING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (AHSY)

~~AIR CONDITIONERS FOR USE IN HAZARDOUS LOCATIONS (AIDR)~~

Room Air Conditioners for Use in Hazardous Locations (AINU) USE AND INSTALLATION

This category covers room air conditioners for use in hazardous locations. They are encased assemblies designed as a unit and intended as the prime source of refrigeration and dehumidification, basically intended to serve a single room, zone or space. They are intended for installation in windows or through walls. These units employ alternating-current, hermetic refrigerant motor-compressors with factory-charged refrigeration systems and include a means for circulating air. The effect of in-wall units on the fire resistance rating of the wall has not been investigated.

AIR CONDITIONING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (AHSY)

Room Air Conditioners for Use in Hazardous Locations (AINU)–Continued

Permanently connected units are intended to be connected only to a branch circuit protected by overcurrent devices which do not exceed the value marked on the data plate or attached wiring diagram. The marked branch circuit overcurrent device protection is the maximum for which the unit has been investigated. If time-delay fuses are required for starting, the unit is marked to this effect.

Cord-connected units that require a time-delay fuse or circuit breaker to permit motor restarting are marked to this effect.

Some room air conditioners may be designed for installation with the indoor side being located in a room purged and pressurized in accordance with ANSI/NFPA 496, "Purged and Pressurized Enclosures for Electrical Equipment," to become an unclassified location, and the outdoor side in a Division 2 hazardous (classified) location. Marking on the product and in the installation instructions identify units intended for this use.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 484, "Room Air Conditioners."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Room Air Conditioner for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AIR FILTERING APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (AISX)

GENERAL

This category covers portable and stationary air-filtering appliances intended for window, floor, table and similar mounting. The appliances consist primarily of air-circulating fans and mechanical filters.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Air Filtering Appliance for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AIR-SAMPLING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (ALOA)

GENERAL

This category covers air-sampling pumps, sample-draw pumps and similar equipment.

RELATED PRODUCTS

AIR-SAMPLING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (ALOA)

Equipment investigated for use only in the hazardous (classified) locations of automotive and marine service stations is covered under Control, Monitoring and Auxiliary Equipment (EQXX).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Air Sampling Equipment for Use in Hazardous Locations" or "Air Sampling Pump for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ALARM SYSTEM UNITS FOR USE IN HAZARDOUS LOCATIONS (ALSY)

INTRUSION-DETECTION UNITS FOR USE IN HAZARDOUS LOCATIONS (ARCX)

GENERAL

This category covers electronic units, including those which utilize rays (photoelectric), electromagnetic waves, ultrasonic radiation, or other electronic principles to signal intrusion or movement within mercantile premises or approaches to safes, stockrooms, etc., that may be used to form a complete protective system.

These units have been investigated for fire, electrical shock, and reliability of operation. The effect of radiation on radio communication or radio navigation has not been investigated.

The Federal Communications Commission should be consulted for regulations governing the use and operation of radiation devices.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 639, "Intrusion Detection Units."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Intrusion Detection Unit," "Intrusion Detection Unit Power Supply" or "Intrusion Detection Unit Accessory."

The product name may be followed by "for Use in Hazardous Locations" or "(Associated Apparatus)."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ALTERNATORS FOR USE IN HAZARDOUS LOCATIONS (ARDK)

GENERAL

This category covers electric alternators intended for use in hazardous (classified) locations.

PRODUCT CATEGORIES BY CATEGORY CODE

ALTERNATORS FOR USE IN HAZARDOUS LOCATIONS (ARDK)

68

For Class I, Division 2 locations, the enclosure may be of the open or totally-enclosed type. The Group designation is marked unless the alternator is acceptable for Groups A, B, C and D. The alternator is also marked with the operating temperature code designating the maximum internal or external surface temperature determined at rated amperes marked on the alternator, if the temperature is greater than 100°C. If the enclosure incorporates one or more arcing or sparking parts, the part is housed in a Class I, Division 1 enclosure or the part is within a hermetically-sealed enclosure, constructed with current-interrupting contacts immersed in oil, located in a nonincendive circuit or located in a purged and pressurized enclosure.

For Class II, Division 2 Locations, the enclosure is of the totally enclosed type. The alternator is marked with the operating temperature or operating temperature code designating the maximum external temperature determined at rated amperes (as marked on the alternator), when operating in free air (not dust blanketed), if the external temperature is greater than 100°C.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Alternator for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AMUSEMENT AND GAMING MACHINES (ASMU)

GENERAL

This category covers self-contained commercial amusement and gaming machines.

The appliances are marked on or adjacent to the electrical rating plate with one of the following: "Suitable for Indoor Use Only," "Suitable for Protected Locations — See Installation Instructions" or "Suitable for Outdoor Use." Complete instructions appear on an appliance intended for use in a protected location, indicating the manufacturer's recommendations concerning the use or installation, or both, of any canopy, marquee, shelter, etc., that may be necessary for the protection of the appliance. The instructions may be located inside the appliance if they are accessible through the front door.

REBUILT PRODUCTS

This category also covers amusement and gaming machines that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt amusement and gaming machines are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt amusement and gaming machines are subject to the same requirements as new amusement and gaming machines.

FACTORS NOT INVESTIGATED

The burglary- and theft-protection features of coin-operated machines have not been investigated unless specifically indicated in the individual certifications.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 22, "Amusement and Gaming Machines."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Amusement Machine" or "Gaming Machine," or other appropriate product name as shown in the individual Listings.

For rebuilt products, the word "Rebuilt," "Refurbished" or "Remanufactured" precedes the product name.

AMUSEMENT AND GAMING MACHINES (ASMU)

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ANTENNA-DISCHARGE UNITS (ASWA)

USE

This category covers antenna-discharge units intended to minimize the effects of voltage surges on antenna-transmission lines.

These products have not been investigated to determine their suitability as lightning-protective devices.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 452, "Antenna-Discharge Units."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Antenna Discharge Unit," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

APPLIANCE CONTROLS (ATNZ)

GENERAL

This category covers controllers (single device or interconnected series of components) with one or more input power and possibly signal ports. Included are controllers with solid-state circuitry, and one or more output switching components to directly control all or a portion of household-type appliances, such as portable luminaires, audio/video equipment, etc. These controllers typically respond directly or indirectly to sensors or remote control signals to affect operation or electronically store or process information by virtue of a memory system.

These controls are intended only for nonindustrial appliances.

RATINGS

Appliance controls are rated maximum 16 A and are intended to be installed on a 20 A maximum branch circuit. The voltage is limited according to the end-product standard. They are not intended for controlling motor-operated appliances unless specifically identified for such use, e.g., appliance controls designated for control of electric fans. They have been investigated for use in nominal 25°C environments, unless otherwise stated in the individual certifications.

PRODUCT MARKINGS

Controls typically have resistive or general use (power factor 0.75 – 0.80) loads. A controller may be specifically identified for other load types, e.g., "Suitable for ___ W lamp loads," or "Suitable for ___ hp electric fans," where the blank identifies the numerical value of the rating.

RELATED PRODUCTS

Devices intended to be part of a building control system are covered under Management Equipment, Energy (PAZX).

Devices that use light and/or motion (passive infrared)-sensitive switches are covered under Switches, Photoelectric (WJCT).

Devices intended for industrial applications are covered under Power Circuit and Motor-mounted Apparatus (NMTR).

Devices such as thermostats are covered under Temperature-indicating and Regulating Equipment (XAPX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 244A, "Solid-State Controls for Appliances."

Controls for devices investigated to end-product standards, such as ANSI/UL 508, "Industrial Control Equipment," are identified in the individual certifications.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Ser-

vice. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Appliance Control," or other appropriate product name as shown in the individual Listings.

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APPLIANCE OUTLET CENTERS (AUJZ)

This category covers appliance outlet centers, which are factory-built assemblies incorporating pre-installed materials and equipment which, after installation, are usually concealed and may not be accessible for inspection at the installation site.

Materials, including the methods used for installation of electrical, mechanical and plumbing equipment incorporated in these assemblies by their manufacturer have been investigated for installation requirements in accordance with ANSI/NFPA 70, "National Electrical Code," NFPA's National Fire Codes, and model building, plumbing and mechanical codes.

Appliance outlet centers are intended for installation subject to approval by the Authority Having Jurisdiction.

Appliance outlet centers consist of one or more electrical outlets and may have one or more outlets of another type (i.e., gas, steam, water supply and drain) supported within a suitable enclosure. The enclosure itself may consist of individual components providing some compartmentalization and a single cover may be provided to enclose all compartments. They are intended for permanent indoor installation where more than one appliance may be used simultaneously. They are intended for connection to feeder circuits consistent with their marked ratings.

Components utilized in the assembly of appliance outlet centers are intended to be suitable for the use and are investigated to conform with the standard for safety which would be used if the component were to be submitted separately.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMMERCIAL APPLIANCE OUTLET CENTERS (AUUZ)

USE AND INSTALLATION

This category covers appliance outlet centers, which consist of a group of outlets with or without suitable branch circuit overcurrent protective devices, branch-circuit switching and/or timer provisions. This category also covers appliance outlet center enclosures intended for use with specific appliance outlet centers.

These products are not intended for use in residential dwellings.

Commercial appliance outlet centers may be provided as complete assemblies or as open-type designs intended to be mounted in specific enclosures. Devices that constitute an open-type assembly are marked to identify the specific commercial appliance outlet center enclosure into which they are intended to be installed. In addition, the enclosures are marked to indicate the specific commercial appliance outlet center(s) intended for use within the enclosure.

ADDITIONAL INFORMATION

For additional information, see Appliance Outlet Centers (AUJZ), Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 891, "Dead-Front Switchboards."

These products are additionally investigated using ANSI/NFPA 70, "National Electrical Code" (NEC), to ensure compliance with the installation and use provisions of the NEC.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Appliance Outlet Center" or "Commercial Appliance Outlet Center Enclosure."

Commercial Appliance Outlet Centers (AUUZ)—Continued

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RESIDENTIAL APPLIANCE OUTLET CENTERS (AVGQ)

USE

This category covers appliance outlet centers intended for use in residential dwellings.

ADDITIONAL INFORMATION

For additional information, see Appliance Outlet Centers (AUJZ), Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in ANSI/NFPA 70, "National Electrical Code."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Residential Appliance Outlet Center."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ARC-DETECTION AND -MITIGATION EQUIPMENT (AVWD)

ARC-MITIGATION EQUIPMENT (AVWP)

GENERAL

This category covers systems for mitigation of arcing faults within equipment rated up to 600 V ac by creating an alternate path of lower impedance for fault current. These devices may also provide a signal intended for operation of a protective device that opens the faulted circuit, or may include the protective device as part of the equipment.

These devices are completely enclosed units that may either be stand-alone units or a vertical section in a series of sections constituting an assembly of distribution equipment. Where provided as a vertical section in a series of sections constituting an assembly, the mitigation equipment may additionally be certified as a section of that assembly, and may additionally be certified as "arc resistant."

The enclosure is marked with one or more of the following Enclosure Type ratings for which it was investigated: Type 1, 2, 3, 3R, 3S, 4, 4X, 5, 6, 6P, 12, 12K or 13. The intended uses for each Enclosure Type are indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

These devices have been investigated for operation within the voltage, current, and time parameters as specified by the manufacturer. The use of arc-mitigation equipment does not ensure that the protected equipment will meet the requirements of ANSI/IEEE C37.20.7, "Guide for Testing Metal-Enclosed Switchgear Rated up to 38kV for Internal Arcing Faults."

The ability of these devices to reduce or eliminate damage to equipment, or to reduce the likelihood of personal injury during internal arcing fault conditions, has not been investigated.

RELATED PRODUCTS

Assemblies of vertical sections containing switches, overcurrent devices or other protective devices are covered under Switchboards, Dead-front (WEVZ).

Assemblies of metal-enclosed vertical sections containing low-voltage-power circuit breakers rated up to 600 V ac, including those investigated as "arc resistant," are covered under Switchgear Assemblies, Metal Enclosed, Low-voltage-power Circuit-breaker Type (WUTZ).

Assemblies of vertical sections containing combination motor controllers are covered under Motor Control Centers (NJAV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2748, "Outline of Investigation for Arcing Fault Mitigation Equipment."

Arc-mitigation Equipment (AVWP)—Continued

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

ARC-MITIGATION EQUIPMENT
AS TO FIRE AND SHOCK HAZARDS ONLY

Control No.

Where provided as a vertical section in a series of sections constituting an assembly, the Classification Mark covers only the section so marked.

ARC-FAULT CIRCUIT INTERRUPTERS
(AVYI)

USE

This category covers arc-fault circuit interrupters (AFCI) intended to mitigate the effects of arcing faults that may pose a risk of fire ignition under certain conditions if the arcing persists.

These devices have been investigated to determine their ability to recognize and react to arcing faults. They have also been investigated to determine resistance to unwanted tripping because of the presence of arcing that occurs in control and utilization equipment under normal operating conditions and to verify that operation is not unduly inhibited by the presence of loads and circuit characteristics that may mask or attenuate unwanted arcing.

PRODUCT MARKINGS

Arc-fault circuit interrupters are marked to identify the type of device to aid the user in determining the intended location in a circuit.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ARC-FAULT CIRCUIT INTERRUPTERS,
BRANCH/FEEDER TYPE (AVZQ)

USE

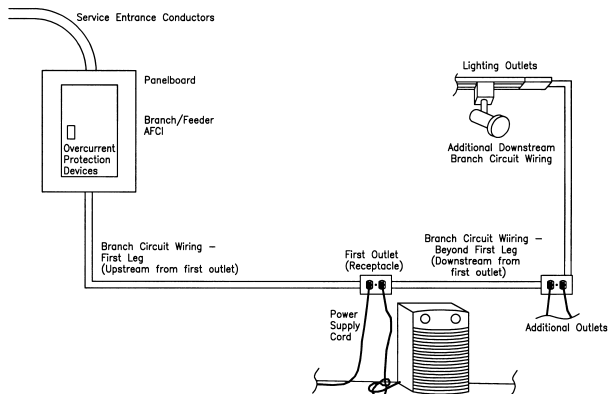
This category covers arc-fault circuit interrupters intended to be installed at the origin of a branch circuit or feeder, such as at a panelboard, where they can function to de-energize the entire branch circuit when an arc fault is detected.

These devices are intended to provide protection of the branch-circuit wiring, feeder wiring, or both, against the unwanted effects of arcing. These devices also provide protection to cord sets and power-supply cords connected to receptacles as shown below.

These devices may be self-contained with an enclosure, separate devices intended to be mounted in an enclosure, or integrated as part of another device, such as a circuit breaker.

PROTECTION PROVIDED

The following branch-circuit diagram and arc-fault-protection table illustrate the protection provided by a branch/feeder AFCI under various arc-fault scenarios.



Arc-fault Scenario
Branch-circuit Wiring

Protection Provided

Arc-fault Circuit Interrupters, Branch/Feeder Type
(AVZQ)—Continued

Arc-fault Scenario	Protection Provided
Parallel Arcing Detection	Y
Series Arcing Detection (With Ground)	Y
Series Arcing Detection Without Ground (#)	N

Cord Sets (Extension Cords),

Power-supply Cords	Protection Provided
Parallel Arcing Detection	Y
Series Arcing Detection	N

Notes

- Y - Arc-fault protection provided
- N - Arc-fault protection not provided
- (#) Branch-circuit wiring systems without ground were permitted prior to the 1962 NEC
- Parallel arcing detection includes arcing line-to-line and line-to-ground

RATINGS

These devices are rated 15 or 20 A, 120 or 120/240 V.

PRODUCT MARKINGS

Branch/feeder AFCIs are marked "Branch/Feeder Arc-fault Circuit-Interrupter" (or "Branch/Feeder AFCI") where visible with a dead-front or faceplate removed, while the device is installed.

ADDITIONAL INFORMATION

For additional information, see Arc-fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1699, "Arc-Fault Circuit-Interrupters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Branch/Feeder Arc Fault Circuit Interrupter" (or "Branch/Feeder AFCI").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ARC-FAULT CIRCUIT INTERRUPTERS,
COMBINATION TYPE (AWAH)

USE

This category covers arc-fault circuit interrupters that comply with the requirements for both branch/feeder-type AFCIs (see AVZQ) and outlet-circuit-type AFCIs (see AWCG). They are intended to provide protection of the branch-circuit wiring, feeder wiring, or both, and cord sets and power-supply cords connected to receptacles against the unwanted effects of arcing.

These devices may be self-contained with an enclosure, separate devices intended to be mounted in an enclosure or outlet box, or integrated as part of another device, such as a circuit breaker or outlet receptacle.

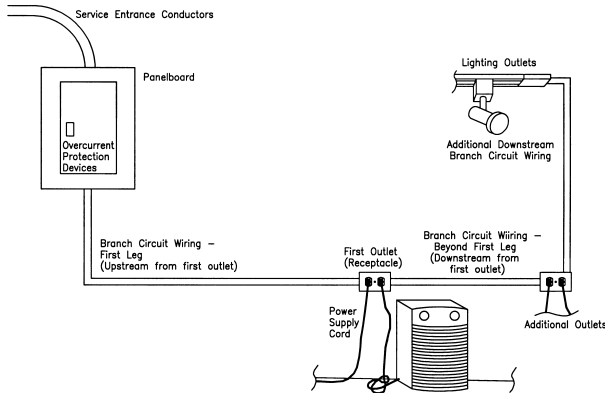
PROTECTION PROVIDED

The following branch-circuit diagram and arc-fault-protection table illustrate the protection provided by a combination AFCI under various arc-fault

ARC-FAULT CIRCUIT INTERRUPTERS (AVYI)

Arc-fault Circuit Interrupters, Combination Type (AWAH)–Continued

scenarios.



Arc-fault Scenario	Protection Provided
Branch-circuit Wiring	
Parallel Arcing Detection	Y
Series Arcing Detection (With Ground)	Y
Series Arcing Detection Without Ground (#)	Y
Cord Sets (Extension Cords), Power-supply Cords	
Parallel Arcing Detection	Y
Series Arcing Detection	Y

Notes

- Y – Arc-fault protection provided
- (#) – Branch-circuit wiring systems without ground were permitted prior to the 1962 NEC
- Parallel arcing detection includes arcing line-to-line and line-to-ground
- Combination AFCIs located at other than the origin of the branch circuit do not protect upstream branch-circuit wiring, cord sets or power-supply cords

RATINGS

These devices are rated 15 or 20 A, 120 V or 120/240 V.

PRODUCT MARKINGS

Combination AFCIs are marked “Combination Arc-fault Circuit-Interrupter” (or “Combination AFCI”) where visible with a dead-front or faceplate removed, while the device is installed.

ADDITIONAL INFORMATION

For additional information, see Arc-fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1699, “Arc-Fault Circuit-Interrupters.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Combination Arc Fault Circuit Interrupter” (or “Combination AFCI”).

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ARC-FAULT CIRCUIT INTERRUPTERS, CORD TYPE (AWAY)

USE

This category covers arc-fault circuit interrupters (AFCI) intended to be connected to a receptacle outlet.

These devices are intended to provide protection to the power-supply cord connected to it against the unwanted effects of arcing. The cord may be integral to the device. The device has no additional outlets.

RATINGS

ARC-FAULT CIRCUIT INTERRUPTERS (AVYI)

Arc-fault Circuit Interrupters, Cord Type (AWAY)–Continued

These devices are rated 30 A maximum, 120 V or 120/240 V.

ADDITIONAL INFORMATION

For additional information, see Arc-fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1699, “Arc-Fault Circuit-Interrupters.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Cord Arc Fault Circuit Interrupter” (or “Cord AFCI”).

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ARC-FAULT CIRCUIT INTERRUPTERS, OUTLET BRANCH CIRCUIT TYPE (AWBZ)

USE AND INSTALLATION

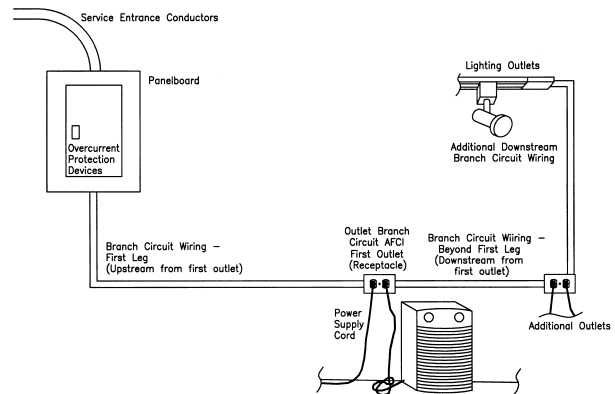
This category covers arc-fault circuit interrupters that have been investigated to provide protection of the downstream branch-circuit wiring, cord sets and power-supply cords against the unwanted effects of arcing. These devices also provide protection to upstream branch-circuit wiring as shown below.

These devices have feed-through connections.

These devices are intended to be installed as the first outlet in a branch circuit.

PROTECTION PROVIDED

The following branch-circuit diagram and arc-fault protection table illustrate the protection provided by an outlet branch-circuit AFCI under various arc-fault scenarios.



Arc-fault Scenario	Protection Provided
Branch-circuit Wiring – First Leg	
Parallel Arcing Detection	N
Series Arcing Detection (With Ground)	Y
Series Arcing Detection Without Ground (#)	Y
Branch-circuit Wiring – Beyond First Leg	
Parallel Arcing Detection	Y
Series Arcing Detection (With Ground)	Y
Series Arcing Detection Without Ground (#)	Y
Cord Sets (Extension Cords), Power-supply Cords	
Parallel Arcing Detection	Y
Series Arcing Detection	Y

Notes

- Y – Arc-fault protection provided
- N – Arc-fault protection not provided

Arc-fault Circuit Interrupters, Outlet Branch Circuit Type (AWBZ)—Continued

- (#) – Branch-circuit wiring systems without ground were permitted prior to the 1962 NEC
- Parallel arcing detection includes arcing line-to-line and line-to-ground

RATINGS

These devices are rated 15 or 20 A, 120 V.

ADDITIONAL INFORMATION

For additional information, see Arc-fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1699A, "Outline of Investigation for Outlet Branch Circuit AFCIs."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Outlet Branch Circuit Arc Fault Circuit Interrupter" (or "Outlet Branch Circuit AFCI").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ARC-FAULT CIRCUIT INTERRUPTERS, OUTLET CIRCUIT TYPE (AWCG)

USE AND INSTALLATION

This category covers arc-fault circuit interrupters intended to be installed at a branch-circuit outlet, such as an outlet box.

These devices are intended to provide protection of cord sets and power-supply cords connected to it against the unwanted effects of arcing. These devices may provide feed-through protection of the cord sets and power-supply cords connected to downstream receptacles.

These devices may or may not have feed-through connections.

These devices may or may not have integral receptacles.

RATINGS

These devices are rated 15 or 20 A, 120 V.

ADDITIONAL INFORMATION

For additional information, see Arc-fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1699, "Arc-Fault Circuit-Interrupters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Outlet Circuit Arc Fault Circuit Interrupter" (or "Outlet Circuit AFCI").

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ARC-FAULT CIRCUIT INTERRUPTERS, PORTABLE TYPE (AWDO)

USE

This category covers arc-fault circuit interrupters intended to be connected to a receptacle outlet. They are provided with one or more outlets.

These devices are intended to provide protection to connected cord sets and power-supply cords against the unwanted effects of arcing.

RATINGS

These devices are rated 20 A maximum, 120 V.

ADDITIONAL INFORMATION

For additional information, see Arc-fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1699, "Arc-Fault Circuit-Interrupters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Ser-

Arc-fault Circuit Interrupters, Portable Type (AWDO)—Continued

vice. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Arc Fault Circuit Interrupter" (or "Portable AFCI").

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ARCHITECTURAL AND FLOATING FOUNTAINS (AWEG)

USE AND INSTALLATION

This category covers electrical equipment systems intended for installation in accordance with Article 680 (Part V) and Article 682 of ANSI/NFPA 70, "National Electrical Code." Equipment may consist of pumps (including submersible pumps), lights, control panels, and timers. Equipment may also include wind sensors, light detectors, freeze-prevention equipment, and the like. These systems may be submersible or intended for remote installation. Systems suitable for outdoor use are so marked.

RELATED PRODUCTS

Similar portable equipment is covered under Fountains, Small Decorative (IQRW).

Control panels for use with equipment intended for water-play fountains and water playground areas, swimming pools and spas, or fountains with water in common with swimming pools are covered under Controls (WAWU).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 778, "Motor-Operated Water Pumps," UL 676, "Underwater Lighting Fixtures," and UL 508A, "Industrial Control Panels."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Architectural Fountain," "Floating Fountain" or "Floating Fountain Equipment," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ARMORED CABLE (AWEZ)

GENERAL

This category covers armored cable in sizes 14-1 AWG copper and 12-1 AWG aluminum or copper-clad aluminum and rated 600 V or less. Aluminum-armored cable is suitable for use in alternating current circuits only. Armored cable is for use in accordance with Article 320 of ANSI/NFPA 70, "National Electrical Code."

ACTH — Indicates armored cable rated 75°C employing conductors having thermoplastic insulation.

ACTHH — Indicates armored cable rated 90°C employing conductors having thermoplastic insulation.

ACHH — Indicates armored cable rated 90°C employing conductors having thermosetting insulation.

Armored cable connectors (box connectors) other than the direct bearing setscrew type are suitable for use on cable employing aluminum armor.

For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

PRODUCT MARKINGS

Armored cable complies with the Flame and Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables" and may be marked with the suffix "LS" and/or "For Use in Cable Trays."

Cable with aluminum armor is identified with the words "ALUMINUM ARMOR" on a marker tape and tag on coils.

Cable with copper-clad aluminum conductors is identified with the designation "AL (CU-CLAD)" or "Cu-Clad Al." on a tag, on the carton or reel. Cable with aluminum conductors is identified with the designation "AL" on a tag, on the carton or reel.

In addition, cable with compact-stranded copper conductors is identified with the designation "Compact Copper" or "CMPCT CU" following the conductor size and the words "Terminate with connectors identified for use with compact-stranded copper conductors" on a tag, on the carton or reel.

RELATED PRODUCTS

For fittings suitable as a grounding means, see Armored Cable Connectors (AWSX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 4, "Armored Cable."

UL MARK

The Listing Mark of UL on the attached tag, the reel or the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Armored cable that contains copper or copper-clad aluminum conductors has the product name "Armored Cable"; armored cable that contains aluminum conductors has the product name "Armored Aluminum Cable"; armored cable that has aluminum armor has the product name "Aluminum Armored Cable."

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ARMORED CABLE CONNECTORS, TYPE AC (AWSX)

GENERAL

This category covers armored-cable connectors suitable for use with armored cable (Type AC). These connectors are intended for installation and use in accordance with the following information and the limitations specified in Armored Cable (AWEZ).

The individual certifications for each connector used with nonmetallic-sheathed cable may have details about the size and number of the nonmetallic-sheathed cable it will secure.

All male threaded fittings have only been investigated for use with lock-nuts.

Additional Fittings — Connectors covered under Metal-clad-cable Connectors, Type MC (PJOX) and Power and Control Tray Cable Connectors (QPOZ) are also suitable for use with armored cable when specifically indicated on the device or carton. Temporary wiring, such as flexible cable or cord, may be secured by the use of a connector suitable for use with flexible cord.

Grounding — Armored-cable connectors (Type AC) are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with the NEC.

Size of Cable Used — Connectors of the 1/2 trade size, unless marked otherwise, are capable of holding 14-2 AWG armored cable and any larger size which it will accommodate.

Use with Aluminum Cable — Connectors other than direct-bearing set-screw type are suitable for use with aluminum-armored cable.

Reusability — Connectors have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction.

MARKINGS

Some connectors are also acceptable for use with flexible metal conduit, flexible cord, nonmetallic-sheathed cable, metal-clad (Type MC) cable, service-entrance cable, flexible nonmetallic tubing, or armored optical-fiber cable as indicated on the device or carton. Connectors for use with nonmetallic-sheathed cable are also suitable for use with multiconductor underground feeder and branch-circuit cable where used in dry locations. Unless marked otherwise on the carton, the connectors are suitable for connection of only one cable per cable entry.

ADDITIONAL INFORMATION

For additional information, see Armored Cable (AWEZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings."

UL MARK

Armored Cable Connectors, Type AC (AWSX)-Continued

The UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Armored Cable Connector."

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ATTACHMENT PLUGS (AXGV)

GENERAL

This category covers the following types of products:

Adapter — A device that adapts one blade or slot configuration to another (including a grounding adapter for a nongrounding receptacle), adapts a receptacle to a lampholder, or adapts a lampholder to a receptacle (also known as a separable attachment plug). (See EMDV for similar products.)

Appliance Coupler — A single-outlet female contact device to be wired on flexible cord as part of a detachable power-supply cord to be connected to a male inlet of an appliance.

Appliance or Flatiron Plug — An appliance coupler type of device having a slot configuration specified for use with heating or cooking appliances.

Attachment Plug — A male contact device for the temporary connection of a flexible cord or cable to a receptacle, cord connector, or other female outlet device.

Cord Connector — A female contact device to be wired on flexible cord for use as an extension from an outlet to make a detachable electrical connection to an attachment plug or, as an appliance coupler, to an equipment inlet.

Male Inlet (Equipment Inlet, Motor Attachment Plug) — A male contact device to be mounted on utilization equipment to provide a detachable electrical connection to an appliance coupler or cord connector.

Nonseparable Attachment Plug — An adapter having a male screw shell and a pair of wire leads to be connected to utilization equipment.

Separable Attachment Plug — An adapter having a male screw shell and a slot configuration outlet.

Shore Power Inlet — A male inlet intended to provide power-supply connection to boats moored to a dock. Shore power inlets are also covered under Shore Power Inlets, Marine (UBXR).

Table Tap — A cord connector having more than one outlet and intended to rest on a horizontal surface while in use.

This category does not cover devices to be molded on flexible cord or wire and unassembled devices to be factory assembled on flexible cord or wire. Such devices are complete only after installation of the flexible cord or wire and they are judged as part of a complete assembly.

Ratings

These devices are rated 600 V or less, ac or dc, and 200 A or less. They may also be rated in horsepower as noted in the individual product categories.

Outlet devices rated 250 V are tested on circuits involving a nominal potential to ground of 125 V. Outlet devices having other voltage ratings are tested on circuits involving full-rated potential to ground, except for multiphase-rated devices, which are tested on circuits consistent with their voltage ratings, i.e., a 120/208 V, 3-phase, device is tested on a circuit involving 120 V to ground.

Terminals

The terminations of devices intended to be wired to flexible cord are based on the use of flexible cord or cable having copper conductors, in accordance with Article 400 of ANSI/NFPA 70, "National Electrical Code" (NEC). The ampacity of flexible cord and cable is based on Section 400.5, Tables 400.5(A) and 400.5(B). The conductors are sized as specified on the product or in the manufacturer's instructions provided with the device. The terminations are based on the use of 60°C flexible cord or cable.

The terminations of devices intended to be wired onto branch-circuit conductors are based upon the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in circuits rated more than 100 A, as specified in Table 310.16 of the NEC.

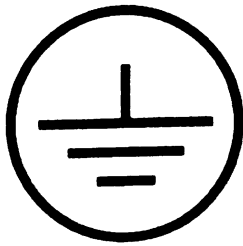
Grounding

Devices having a terminal identified by a green-colored finish, the words "green" or "ground," the letters "G" or "GR," or the grounding symbol

PRODUCT CATEGORIES BY CATEGORY CODE

ATTACHMENT PLUGS (AXGV)

are grounding types. The blade, pin or contact number connected to this



terminal is for equipment grounding only.

Enclosures

In general, devices having integral enclosures or installed as intended have been investigated for use indoors, in dry locations. All such Listed products provide a degree of protection against ordinary corrosion, accidental contact with live parts, and a limited amount of falling dirt. Some devices have been investigated for use in other operating environments when unmated and when mated with other devices in the same manufacturer's line of products. They are marked with one of the type designations 2 through 6, 12 and 13 indicated in Electrical Equipment for Use in Ordinary Locations (AALZ). All outdoor types provide a degree of protection against rain, snow, and sleet. Outdoor types are also suitable for use indoors if they meet the environmental conditions present. A device that complies with the requirements for more than one type of enclosure may be marked with multiple designations. Complete use and mating information is provided in the installation instructions provided with each device.

RELATED PRODUCTS

This category does not cover pin-and-sleeve-type devices; refer to Pin-and-Sleeve-type Plugs, Receptacles and Cable Connectors (QLGD).

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ATTACHMENT PLUGS, FUSELESS (AXUT)

GENERAL

This category covers adapters, appliance couplers, appliance and flatiron plugs, attachment plugs, cord connectors, male inlets (equipment inlets, motor-attachment plugs), nonseparable attachment plugs, separable attachment plugs, shore-power inlets and table taps. These devices do not incorporate switches or overcurrent protection.

Devices for Use in Hospitals — Attachment plugs and cord connectors certified for hospital use in other than hazardous (classified) locations in accordance with Article 517 of ANSI/NFPA 70, "National Electrical Code," are identified by (1) the marking "Hospital Only" (used to identify a specific grounding locking configuration rated 20 A, 125 V, used for the connection of mobile x-ray and similar equipment), or (2) the marking "Hospital Grade," and a green dot on the device. Male inlets may be identified only by the marking "Hospital Only." The identification is visible after installation on the flexible cord or, in the case of the male inlets, on the utilization equipment.

Federal Specification — Some certified attachment plugs, cord connectors and male inlets in this category have been investigated to Federal Specification W-C-596, "General Specification for Electrical Power Connectors."

Terminals — Terminals of appliance couplers, appliance and flatiron plugs, attachment plugs, cord connectors and table taps are intended for use with stranded copper conductors of the type used in flexible cord. Terminals of male inlets (motor attachment plugs) and shore-power inlets of the wire-binding screw, setscrew, or screw-actuated back-wired clamping types are suitable for use with both solid and stranded wire.

Horsepower Ratings — In addition to ampere and voltage ratings, standard ac horsepower ratings corresponding to the amp and voltage ratings assigned to specific attachment plugs not incorporating overcurrent protection or a switch are given in the table below. For a Design E motor rated more than 2 horsepower, it is necessary to use an attachment plug having a horsepower rating not less than 1.4 times the standard ac horsepower rating. The NEMA configuration designation is included for reference. Devices other than attachment plugs, and attachment plugs of configurations other than those indicated in the table, have horsepower ratings only if such ratings are marked on the device.

Horsepower Ratings for NEMA Configuration Attachment Plugs

Amps Rating	AC V Rating	No. of Phase	No. of Poles	No. of Wire	NEMA Dsg	HP Rating
15	125	1	2	2	1-15, L1-15	1/2
	125	1	2	3	5-15, L5-15	1/2
	250	1	2	2	2-15	1-1/2#

ATTACHMENT PLUGS (AXGV)

Attachment Plugs, Fuseless (AXUT)—Continued

Amps Rating	AC V Rating	No. of Phase	No. of Poles	No. of Wire	NEMA Dsg	HP Rating	
20	250	1	2	3	6-15, L6-15	1-1/2#	
	277	1	2	3	7-15, L7-15	2	
	125/250	1	3	4	14-15	1-1/2 L-L#, 1/2 L-N	
	250	3	3	3	11-15, L11-15	2	
	250	3	3	4	15-15	2	
	120/208	3	4	4	18-15	2	
	125	1	2	3	5-20, L5-20	1	
	250	1	2	2	2-20, L2-20	2#	
	250	1	2	3	6-20, L6-20	2#	
	277	1	2	3	7-20, L7-20	2	
	480	1	2	3	L8-20	3	
	125/250	1	3	3	10-20, L10-20	2 L-L#, 1 L-N	
	125/250	1	3	4	14-20, L14-20	2 L-L#, 1 L-N	
	250	3	3	3	11-20, L11-20	3	
	250	3	3	4	15-20, L15-20	3	
	20	480	3	3	3	L12-20	5
480		3	3	4	L16-20	5	
120/208		3	4	4	18-20, L18-20	2	
120/208		3	4	5	L21-20	2	
277/480		3	4	4	L19-20	5	
277/480		3	4	5	L22-20	5	
30		125	1	2	3	5-30, L5-30	2
		250	1	2	2	2-30	2#
		250	1	2	3	6-30, L6-30	2#
		277	1	2	3	7-30, L7-30	3
		480	1	2	3	L8-30	5
		125/250	1	3	3	10-30, L10-30	2 L-L#, 2 L-N
		125/250	1	3	4	14-30, L14-30	2 L-L#, 2 L-N
		250	3	3	3	11-30, L11-30	3
	250	3	3	4	15-30, L15-30	3	
	480	3	3	3	L12-30	10	
	480	3	3	4	L16-30	10	
	120/208	3	4	4	18-30, L18-30	3	
	120/208	3	4	5	L21-30	3	
	277/480	3	4	4	L19-30	10	
277/480	3	4	5	L22-30	10		
50	125	1	2	3	5-50	2	
	250	1	2	3	6-50	3#	
	277	1	2	3	7-50	5	
	125/250	1	3	3	10-50	3 L-L#, 2 L-N	
	125/250	1	3	4	14-50	3 L-L#, 2 L-N	
	250	3	3	3	11-50	7-1/2	
	250	3	3	4	15-50	7-1/2	
	120/208	3	4	4	18-50	7-1/2	
60	125/250	1	3	4	14-60	3 L-L#, 2 L-N	
	250	3	3	4	15-60	10	
	120/208	3	4	4	18-60	7-1/2	

L-L: Motor connected line-to-line

L-N: Motor connected line-to-neutral

Also suitable for 208 V motor applications at the indicated horsepower rating

For three-phase devices, the horsepower ratings indicated are for three-phase motor loads.

Refer to ANSI/NEMA WD 6 (2002), "Wiring Devices – Dimensional Specifications," for configurations of the NEMA designations.

ADDITIONAL INFORMATION

For additional information, see Attachment Plugs (AXGV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 498, "Attachment Plugs and Receptacles."

Where indicated in the individual certifications, attachment plugs, cord connectors and male inlets have additionally been investigated to Federal Specification W-C-596, "General Specification for Electrical Power Connectors."

UL MARK

Attachment Plugs, Fuseless (AXUT)–Continued

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fuseless Attachment Plug” or “Plug,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ATTACHMENT PLUGS WITH SWITCHES (AYIR)

GENERAL

This category covers appliance couplers, appliance plugs, attachment plugs, male inlets (equipment inlets, motor attachment plugs), and flatiron plugs incorporating switches.

RELATED PRODUCTS

See Snap Switches (WJQR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 498, “Attachment Plugs and Receptacles,” and ANSI/UL 20, “General-Use Snap Switches,” or ANSI/UL 1054, “Special-Use Switches,” or ANSI/UL 61058-1, “Switches for Appliances – Part 1: General Requirements.”

UL MARK

The Listing Mark of UL on the product, or the UL symbol stamped or molded into the product and the Listing Mark on the smallest unit packaging is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Switch.”

In lieu of the UL symbol stamped or molded into the product, “UNDERWRITERS LABORATORIES INC. LISTED” (or “UND. LAB. INC. LIST”) may be stamped or molded into the product. When marked as such, the Listing Mark shall appear on the smallest unit packaging.

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ATTACHMENT PLUGS WITH OVERLOAD PROTECTION (AYVZ)

USE

This category covers attachment plugs, separable and nonseparable attachment plugs, cord connectors, and male inlets designed to accommodate standard fuses, or provided with circuit breakers or equivalent over-current protection.

ADDITIONAL INFORMATION

For additional information, see Attachment Plugs (AXGV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 498, “Attachment Plugs and Receptacles.”

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Attachment Plug with Overload Protection,” “Attachment Plug” or “Cord Connector,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Attachment Plugs with Overload Protection (AYVZ)–Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AUDIO AND RADIO EQUIPMENT, COMMERCIAL (AZCY)

COMMERCIAL AUDIO AND RADIO EQUIPMENT, SYSTEMS AND ACCESSORIES (AZJX)

GENERAL

This category covers power-operated audio and radio equipment and accessories rated 300 V or less and designed to meet the use requirements of commercial enterprises or establishments, churches, schools, theaters, factories and similar locations, and connected to supply circuits in accordance with ANSI/NFPA 70, “National Electrical Code.”

Commercial audio and radio equipment includes amplifiers, preamplifier mixers, signal processors, etc. for general use; public address and centralized sound systems; intercommunication devices and systems; radio receivers, tuners and tuner/amplifiers; record turntables, sound masking systems, tape decks and power supplies intended for use with commercial sound systems; special effects units and integral amplifier/speakers, etc. that are intended for use by professional and semi-professional musicians.

This category also covers accessories for use with commercial audio and radio equipment such as audio modulated lights, audio level indicators, etc.

Products of the above types may also be covered under Audio/Video Apparatus (AZSQ).

This category does not cover dictating or transcribing machines for office use.

This category does not cover musical instruments and accessories other than those noted above; see Musical Instruments (PWHZ).

Speakers and their accessories that have been investigated for mounting in air-handling spaces are specifically identified by markings on the product and in the individual certifications. Installation details are shown on the product or are provided in a separate installation document provided with the product and referenced in the marking on the product.

Products intended to form part of any fire-resistant barrier assembly can be found in the Fire Resistance Directory.

Equipment rack systems consist of an equipment rack and one or more audio or video components such as amplifiers, equalizers, VCRs and similar equipment. Each component installed in the rack that does not bear the Certification Mark is identified by type and model number on a tag that is permanently attached to the rack. If all components installed in the rack bear the Certification Mark, the tag is not required.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 813, “Commercial Audio Equipment.”

In addition, ANSI/UL 2043, “Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces,” is used to investigate nonmetallic materials of products marked suitable for use in air-handling spaces.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Commercial Audio System,” “Commercial Audio Equipment,” “Commercial Sound Equipment,” “Commercial Audio Product,” “Commercial Radio,” or other appropriate product name (prefixed by “Commercial”) as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AUDIO/VIDEO APPARATUS (AZSQ)

GENERAL

This category covers the following apparatus – rated 300 V or less and designed for household use, commercial use in churches, schools, and institutions and/or in other public places – that is to be connected to the supply mains either directly or indirectly:

- (1) Apparatus and accessories that transmit or receive signals from an antenna. This includes apparatus that produces or reproduces information that is analog or digital in nature.
- (2) Audio apparatus and accessories that reproduce or process audio signals, including amateur radios, amplifiers, apparatus for the visually impaired and the physically handicapped, disc players, head demagnetizers, intercommunicating devices and systems, preamplifier mixers, preamplifiers, public address and centralized sound systems, radio clocks, radio-clock-telephones, radio receivers, signal processors for general use, sound masking systems, transceivers, tuners, and tuner-amplifiers.
- (3) Video apparatus that receives signals from an antenna, through a CATV/MATV cable system, from a video-recorded medium, or from image producing units, such as antenna amplifiers, antenna-positioning apparatus, cable (CATV) television converters, cable television descramblers, master antenna amplifiers, microwave or satellite receivers, school televisions, television monitors, television receivers, television tuners, video cameras, video switchers and encoders, video tape recorders, and video-amplification, -processing, -receiving, -recording, and -reproducing apparatus.
- (4) Motor-driven apparatus that comprises one or more of the above-mentioned apparatus, or can be used only in combination with one or more of them including phonographs, radio-phonographs, tape players and recorders that utilize records, tape, or wire, record changers, television/radio-phonographs, television/video tape recorders, turntables, and similar apparatus. Commercial apparatus has complete reproduction facilities including record turntable, and/or tape deck, amplifier and speaker. Unless specifically noted otherwise in the individual certifications, these units are for indoor use only.
- (5) Other apparatus obviously provided to be used in combination with the above-mentioned apparatus, such as cable-connected remote control devices, power supplies for use with commercial sound systems, special effects units and integral amplifier-speakers that are intended for use by professional and semiprofessional musicians.
- (6) Electronic accessories, wherein the accessories are separate, but are used in addition to or as a supplement to the basic apparatus, such as audio-modulated lights, audio-level indicators, character generators, CRT degaussers, digital processors, editing controllers, tape erasers, tape rewinders.
- (7) Portable audio or video apparatus that is intended for use with a vehicle, marine, or any other battery circuit as the power supply means.
- (8) Battery eliminators, including direct-plug-in adapters and other types of power supplies intended for use with apparatus covered in this category.
- (9) Carts, stands and similar apparatus marked for use with specific audio and video apparatus.
- (10) Apparatus incorporating low-energy induction-power-transfer technology as follows: a) induction-power transmitters intended to be supplied by a branch circuit of 600 V or less, b) induction receivers intended for use with specific induction-power transmitters, and c) induction receivers intended for use with induction-power transmitters conforming to industry-accepted interoperability specifications. The output of an induction receiver does not exceed (i) 60 V d.c. or 42.4 V peak, and (ii) 100 VA capacity.

ACCESSORIES

Field-installed accessories to certified equipment are provided with suitable markings and/or instructions detailing proper installation or assembly of the accessory with either specific or generic certified equipment specified in the markings or instructions.

REBUILT PRODUCTS

This category also covers audio and video apparatus that is rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt audio and video apparatus is rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt audio and video apparatus is subject to the same requirements as new audio and video apparatus.

SPECIAL CONSIDERATIONS

Unless specified in the individual certifications, the efficacy, including reliability, interoperability and functionality of this equipment, has not been investigated.

RELATED PRODUCTS

Television and video equipment intended for use in health care facilities is investigated to UL 6500, “Audio/Video and Musical Instrument Apparatus for Household, Commercial and Similar General Use,” or ANSI/UL 60065, “Audio, Video and Similar Electronic Apparatus – Safety Requirements,” and is covered under Television/Video Equipment for Use in Health Care Facilities (KFCV).

Musical instruments and their accessories are investigated to UL 6500 or ANSI/UL 60065 and are covered under Musical Instruments (PWHZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 6500, “Audio/Video and Musical Instrument Apparatus for Household, Commercial and Similar General Use,” or ANSI/UL 60065, “Audio, Video and Similar Electronic Apparatus – Safety Requirements.”

Products investigated for use in air-handling spaces are marked “Suitable for Use in Other Environmental Air Space in Accordance with Section 300.22, (C) of the National Electrical Code,” or “Suitable for Use in Air-Handling Spaces.” These products have been additionally investigated to UL 2043, “Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces.” Products that bear the marking are suitable for installation in accordance with ANSI/NFPA 70, “National Electrical Code,” ANSI/NFPA 90A, “Installation of Air-Conditioning and Ventilating Systems,” the “International Mechanical Code,” and the “Uniform Mechanical Code.”

Carts and similar apparatus having a top load surface that are more than one meter above the floor, and that are intended for use in schools, institutions, hospitals, or similar locations where children may move them, also comply with the applicable requirements in ANSI/UL 1667, “Tall Institutional Carts for Audio-, Video-, and Television-Type Equipment.”

Apparatus incorporating induction-power-transfer technology associated with low-energy products have additionally been investigated to ANSI/UL 2738, “Induction Power Transmitters and Receivers for Use with Low Energy Products.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Audio/Video Apparatus,” “Audio Equipment,” “Audio Product,” “Audio System,” “Commercial Audio Equipment,” “Commercial Audio Product,” “Commercial Audio System,” “Musical Instrument,” “Radio Receiver,” “Television Equipment” (or “TV Equipment” or “TV Equip”), “Television Receiver,” “Video Equipment,” “Video Product,” “Video System,” “AV Product,” “AV Apparatus,” “AV Power Supply,” or the name of the specific type of product as shown in the individual Listings, or combinations of the product identities where required.

The category identifier for field-installed accessories includes the word “Accessory.”

For rebuilt products the word “Rebuilt,” “Remanufactured” or “Reconditioned” precedes the product name.

Equipment rack systems consist of an equipment rack and one or more audio or video components such as amplifiers, equalizers, VCRs and similar equipment. Each component installed in the rack that does not bear the UL Mark is identified by type and model number on a tag that is permanently attached to the rack. If all components installed in the rack bear the UL Listing Mark, the tag is not required.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AUDIO AND VIDEO EQUIPMENT (AZUJ)

EQUIPMENT TYPES

This category covers:

- (1) **Audio products and accessories** intended for household use and involved with the reproduction or processing of audio signals such as amateur radio products, amplifiers, disc players, intercommunicating devices, radio-phonographs, radio receivers, radio-clocks, record players, tape recorders, tape players, transceivers, tuners, tuner-amplifiers, and similar products.
- (2) **Video products** intended for household or commercial use that receive signals off the air from a satellite or microwave antenna, through a CATV/MATV cable system, from a video-recorded medium, or from image producing units. Examples of such products are video tape recorders, video-receiving, -processing, -recording, -reproducing, and -amplification products, antenna amplifiers, antenna positioning equipment, cable television (CATV) converters, microwave or satellite receivers, television tuners, television cameras, television receivers and monitors, and similar products. These products have not been evaluated for security surveillance protection; see “Related Equipment” below.
- (3) **Auxiliary products and accessories** intended for use with audio or video products wherein the auxiliary and accessory products are separ-

rate and do not perform the desired function, but are used in addition to or as a supplement to products according to items (1) and (2). Examples of such products are character generators, digital processors, editing controllers, video switches and encoders, CRT degaussers, video tape rewinders, head demagnetizers, tape erasers, separately enclosed nonpowered loudspeakers, and similar products.

- (4) Portable audio or video products of the types described in items (1)–(3) intended for use with a vehicular, marine, or any other battery circuit as the power supply means.
(5) Carts and stands and similar structures marked for use with specific audio and video products.

Products of the above types may also be covered under Audio/Video Apparatus (AZSQ).

REBUILT PRODUCTS

This category also covers audio and video equipment that is rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt audio and video equipment is rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts.

Rebuilt products of the types noted under EQUIPMENT TYPES above may also be covered under Audio/Video Apparatus (AZSQ).

RELATED EQUIPMENT

Commercial audio products are covered under Commercial Audio and Radio Equipment, Systems and Accessories (AZJX) or Commercial Phonographs, Tape Playing and Recording Appliances and Accessories (AZQW).

Household, commercial, and professional use carts, stands, shelves and similar structures not identified for use with specific audio or video products are covered under Carts and Stands for Household, Commercial and Professional Use (CZUV).

Carts and similar structures, not identified for use with specific audio or video products, having a top load surface that is more than 1 meter (39.37 in.) above the floor, and that are intended for use in schools, institutions, hospitals or like locations where children are likely to move them or may be asked to move them are covered under Carts, Tall Institutional (CZWK).

Video products intended for entertainment purposes in unclassified locations of health care facilities are covered under Television/Video Equipment for Use in Health Care Facilities (KFCV).

Professional audio and video equipment is covered under Video and Audio Equipment, Professional (ZCZY).

Battery chargers and power supplies, portable or for permanent installation and not packaged with or specifically referenced in literature packaged with an audio or video product, are covered under the respective categories.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1492, "Audio-Video Products and Accessories."

Carts and similar structures having a top load surface that is more than 1 meter (39.37 in.) above the floor, and that are intended for use in schools, institutions, hospitals or similar locations where children may move them, also comply with the applicable requirements of ANSI/UL 1667, "Tall Institutional Carts for Audio-, Video-, and Television-Type Equipment."

Circuits in audio and video products intended to connect directly to a telecommunication network also comply with the applicable requirements of ANSI/UL 1459, "Telephone Equipment."

Separately enclosed nonpowered loudspeakers, not intended for connection to a specific audio amplifying source, comply with the requirements in the Electronic Industries Association (EIA) Interim Standard IS-33, "Recommended Loudspeaker Safety Practices — An Industry Guideline", dated May 1987.

Audio or video products intended for use by children also comply with the applicable requirements in ANSI/UL 696, "Electric Toys."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Audio Equipment," "Audio Product," "Audio System," "Radio Receiver," "Television Equipment," "Television Receiver," "Video Equipment," "Video Product," "Video System," "AV Product," "AV Apparatus," or other appropriate product name as shown in the individual Listings, or combinations of the preceding identities where required.

For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufac-

turer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AUDIO AND VIDEO EQUIPMENT CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (AZVG)

USE AND INSTALLATION

This category covers retrofit devices or kits consisting of parts and/or subassemblies intended for field installation by qualified service personnel in UL-certified commercial audio and video equipment that involves modifying, revising, or replacing the circuitry internal to the certified equipment. These products have been investigated to determine that, when installed in accordance with the manufacturer's installation instructions, they do not adversely affect the operation of the specified equipment.

The retrofit kits are limited in the amount of field revision that will be performed to no more than 50% revision to or replacement of the certified product circuitry. The parts that form the enclosure of the certified product may be modified in the field, to fulfill the installation of the kit, but not replaced. Installation instructions are provided with each kit and include information identifying the specific equipment into which the kit may be installed. The instructions include a statement indicating that, upon completion of the retrofit, a 1000 V AC or DC Dielectric Strength test is to be performed between specified points.

RELATED EQUIPMENT

See Audio/Video Apparatus (AZSQ) and Audio and Video Equipment (AZU).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate the retrofit kits in this category and their combination with the specified end-use product is UL 1492, "Audio-Video Products and Accessories," or UL 6500, "Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

RETROFIT KIT FOR INSTALLATION IN SPECIFIED [identification of equipment]

IDENTIFIED IN THE MANUFACTURER'S INSTALLATION INSTRUCTIONS

Control No.

The Classification Mark appears on the largest part of the kit assembly that can be readily assembled by an installer on site. Each major part of the kit is identified by appropriate marking.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BANK EQUIPMENT (BALZ)

GENERAL

This category covers bank equipment, including currency dispensers, depositories, motor-operated vault doors, remote tellers' systems, tellers' fixtures and similar devices. They have been investigated for conformity to the installation and use provisions of ANSI/NFPA 70, "National Electrical Code." These products have been certified as to electrical fire, shock and casualty hazards only.

FACTORS NOT INVESTIGATED

The burglary and theft protection features of this equipment have not been investigated. Vault doors have not been investigated for the protection of openings in walls against fire or for the protection of records stored in the vault.

RELATED EQUIPMENT

Automated teller machines (ATMs) investigated for security and burglary resistance are covered under Automated Teller Systems (TPEU).

Currency-handling equipment not for exclusive use in banks may be covered under Information Technology Equipment (NWGQ). The performance and functional characteristics of this equipment have not been investigated.

BANK EQUIPMENT (BALT)

Electrically operated control mechanisms that receive coins, currency, credit cards, debit cards or tokens to select prices, accumulate credits, store coins or currency, give change, or initiate a vend cycle for an appliance, or combinations of these functions, are covered under Coin and Currency Changers and Actuators (DUCU).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 60950-1, "Information Technology Equipment – Safety – Part 1: General Requirements."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

BANK EQUIPMENT

AS TO ELECTRICAL FIRE, SHOCK, AND CASUALTY HAZARDS ONLY Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUBRICANT-DISPENSING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (BAYZ)

GENERAL

This category covers equipment intended for dispensing lubricants, such as lubricating oils and greases. The lubricants intended to be dispensed by this equipment involve flash points greater than 200°F.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Lubricant Dispensing Equipment for Hazardous Locations" or "Lubricant Dispenser for Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BATTERIES FOR USE IN ELECTRIC VEHICLES (BBAS)

GENERAL

This category covers electric energy storage assemblies consisting of battery packs, electrochemical capacitor packs, or hybrid battery and electrochemical packs intended for use in on-road electric vehicles and off-road industrial electric vehicles, such as industrial lift trucks. These electric energy storage assemblies are ready for installation into an electrical vehicle and consist of component cell and/or capacitor modules contained in a supplemental protective enclosure, with protective devices that may be located either within the pack enclosure or provided with their own enclosure and located external to the pack. The electric energy storage assemblies are secondary (rechargeable) type and range in size and shape and are suitable for various electric vehicle (EV), hybrid electric vehicle (HEV), and plug-in hybrid electric vehicle (PHEV) applications. ANSI/UL 2580, "Batteries for Use in Electric Vehicles," is nonchemistry specific and addresses various battery chemistries, such as lithium-ion, nickel-metal hydride, lead acid, sodium metal chloride, etc., and includes electrochemical capacitors.

BATTERIES FOR USE IN ELECTRIC VEHICLES (BBAS)

These electric energy storage assemblies have been investigated for potential electric shock hazards, fire hazards including combustible gas concentrations, explosion hazards, and toxic gas and electrolyte exposure hazards to vehicle occupants.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2580, "Batteries for Use in Electric Vehicles."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Lithium-ion * Battery," "Nickel-metal Hydride * Battery," "Lead-acid * Battery," "Sodium Metal Chloride * Battery" or "Electrochemical Capacitor."

* EV, HEV or PHEV

BATTERIES FOR USE IN LIGHT ELECTRIC RAIL AND STATIONARY APPLICATIONS (BBFX)

GENERAL

This category covers batteries intended for various stationary applications, such as energy storage for wind turbines, and photovoltaic and uninterruptible power supply applications.

This category also covers batteries for use in light electric rail (LER) applications and stationary rail applications, such as rail substations. These batteries are intended for installation within the rail car or within a sheltered stationary location, such as a rail substation. These batteries may utilize regenerative braking from the trains as a source of energy for recharging and are intended for direct connection to the rail power lines. These devices are intended for balancing loads during peak hours, serving as an energy storage device during regenerative braking of the trains, and as a source of emergency power to move trains to the nearest station during power outages.

Various battery chemistries are included, such as lithium-ion, nickel-metal hydride and sodium-metal chloride. They are intended for use in accordance with ANSI/NFPA 70, "National Electrical Code."

These batteries have been investigated for potential electric shock, fire and explosion hazard.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1973, "Outline of Investigation for Batteries for Use in Light Electric Rail (LER) Applications and Stationary Applications."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Lithium-ion * Battery," "Nickel-metal Hydride * Battery," "Sodium-metal Chloride * Battery" or "Lead-acid * Battery."

* LER-application or Stationary-application

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BATTERY CHARGERS FOR ENGINE-DRIVEN EMERGENCY AND STANDBY POWER SYSTEM GENERATORS (BBHH)

GENERAL

This category covers battery chargers for automatically controlling and maintaining the charge on batteries used to start internal-combustion

BATTERY CHARGERS FOR ENGINE-DRIVEN EMERGENCY AND STANDBY POWER SYSTEM GENERATORS (BBHH)

engines driving emergency and standby power system generators. The equipment consists of rectifying stacks, transformers, controlling relays, switches and meters.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1236, "Battery Chargers for Charging Engine-Starter Batteries," and the applicable requirements of ANSI/NFPA 110, "Emergency and Standby Power Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Battery Charger for Use with Emergency Generators," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BATTERY-POWERED PORTABLE LAND MOBILE RADIOS FOR USE IN HAZARDOUS LOCATIONS (BBRX)

GENERAL

This category covers battery-powered, portable, two-way land mobile radios for use by either the U.S. Federal Communications Commission for nonfederal government users, or the U.S. National Telecommunications and Information Administration for federal government users, which are to be used in areas designated as Class I, Class II or Class III hazardous (classified) locations in accordance with ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standard used to investigate products in this category is TIA-4950 (2012), "Requirements for Battery-Powered, Portable Land Mobile Radio Applications in Class I, II, and III, Division 1, Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product, or the Listing Mark on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Land Mobile Radio for Use in Hazardous Locations." The words "Land Mobile Radio" may be abbreviated "LMR," and the words "Hazardous Locations" may be abbreviated "Haz. Loc."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BOAT CABLE (BDFX)

GENERAL

This category covers boat cable, which consists of a single insulated conductor without a jacket or two or more insulated conductors with or without an overall nonmetallic jacket, and which is suitable for use in marine pleasure crafts. Boat cable is rated 600 V or less, 60°C (122°F) or 75°C (167°F) wet, 60 to 200°C dry locations and, for cable so marked, 60°C (140°F) and lower temperatures where exposed to oil. The cable employs stranded copper conductors in a size range of 18 to 4/0 AWG inclusive for multiple-conductors, 16 to 4/0 AWG inclusive for single conductors.

Ampacities shall be in accordance with United States Coast Guard Regulations Title 33, Chapter I Parts 183.430 and 183.435 of the CFR.

BOAT CABLE (BDFX)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Marine Products (AAMP).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1426, "Electrical Cables for Boats."

Cable rated 600 V is investigated to UL 1426. Cable rated 50 V is investigated to SAE J1127, J1128, or J378b.

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, coil, reel, or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Boat Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BOILERS, ELECTRIC (BDJS)

GENERAL

This category covers electrically heated steam and hot water boilers that are within the scope of ASME Boiler and Pressure Vessel Codes, Volume I (Power Boilers) and Volume IV (Heating Boilers). This category may also include water heaters if, based on water temperature, input rating, or water tank capacity, they fall under the scope of the above ASME codes.

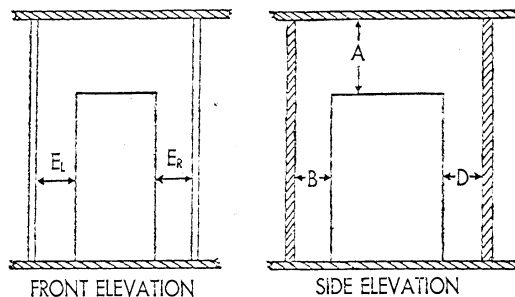
The pressure vessels of these appliances are constructed and stamped in accordance with the applicable section of the ASME Boiler and Pressure Vessel Code. The boilers are equipped with necessary temperature- or pressure-regulating and limit controls and with the appropriate ASME-rated pressure relief devices, and are marked with the appropriate ASME symbol.

INSTALLATION

Each boiler is provided with a marking that indicates the floor material (combustible or noncombustible) on which the boiler may be mounted and the necessary clearances from all other surfaces of the boiler to combustible materials.

The minimum acceptable clearances in inches between the boiler surfaces and adjacent combustible surfaces, the type of flooring required for mounting the boiler and the proper installation in an alcove or closet are indicated on the published printed cards by appropriate symbols and dimensions. The clearances so designated are the minimum required to avoid overheating; additional clearances may be required for accessibility. Each clearance requirement is indicated on the published printed cards by appropriate symbols and dimensions.

A boiler installation is indicated as follows:



Installation Symbols and Abbreviations

Descriptions of symbols and abbreviations applicable to the installation of electric boilers are as follows:

- A – Clearance above top of boiler
- B – From front of boiler. Prefix "C" to numeral indicates suitability for closet or alcove installations; prefix "A" indicates suitability for alcove installation only
- D – From back of boiler
- E_L – From left side of boiler
- E_R – From right side of boiler
- F – Indicates type of flooring: NC = Noncombustible, C = Combustible; numeral indicates minimum clearance below suspended units to combustible floor
- G – Total minimum free area, in square inches, of closet ventilating openings

RELATED PRODUCTS

PRODUCT CATEGORIES BY CATEGORY CODE

Water heaters for potable water limited to a maximum water temperature of 99°C (210°F) are covered under the various subcategories of the category Water Heaters (KSAV). Other hot water and steam generating equipment employing construction outside the scope of the ASME Boiler and Pressure Vessel Code are covered under the Heaters and Heating Equipment (KKBV) subcategories of Industrial and Laboratory (KQLR); Cooking Appliances, Commercial (KNGT) and Household (KNUR); and Heaters, Miscellaneous (KSOT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 834, "Heating, Water Supply, and Power Boilers - Electric."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Boiler," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BOXES, ENCLOSURES, HANDHOLES AND VAULTS, UNDERGROUND, UTILITY SPECIFICATION (BGHL)

GENERAL

This category covers boxes, enclosures, handholes, vaults, and the associated covers for underground utility company installations and similar uses. These products are intended for installation as specified by the Authority Having Jurisdiction, and provide a level of protection with respect to unintentional mechanical loading only. These products have also been investigated for chemical resistance, sunlight exposure, water absorption and flammability. They have not been investigated for protection of any installed electrical equipment against any of these environmental conditions.

The Vertical Design Load of the system (box, enclosure, handhole or vault in combination with a cover) is equal to the lowest Vertical Design Load of either component. The Lateral Design Load is equal to that of the box, enclosure, handhole or vault.

PRODUCT MARKINGS

Boxes, enclosures, handholes and vaults are marked with a Vertical Design Load and a Lateral Design Load. Covers for use with these boxes, enclosures, handholes and vaults are marked with a Vertical Design Load only. Boxes, enclosures, handholes and vaults are marked to identify the covers with which they may be used. Covers are also marked to identify the boxes, enclosures, handholes and/or vaults for which they are suitable. Design Load markings may be in the form of a Tier rating as shown below:

Tier Level	Application	Vertical Design Load, lbs	Lateral Design Load, lbs/sq ft
5	Sidewalk applications with an additional factor for occasional nondeliberate vehicular traffic	5000	600
8	Sidewalk applications with an additional factor for nondeliberate vehicular traffic	8000	600
15	Driveway, parking lot and off-roadway applications subject to occasional nondeliberate heavy vehicular traffic	15,000	800

Tier Level	Application	Vertical Design Load, lbs	Lateral Design Load, lbs/sq ft
22	Driveway, parking lot and off-roadway applications subject to occasional nondeliberate heavy vehicular traffic	22,500	800

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is Society of Cable Telecommunications Engineers Standard ANSI/SCTE 77, "Specification for Underground Enclosure Integrity."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, one of the following product names: "Underground Box," "Underground Enclosure," "Underground Handhole," "Underground Vault," "Cover for Underground ____" (where the blank is filled in with "Box," "Enclosure," "Handhole" or "Vault" as appropriate), or other appropriate product name as shown in the individual Listings, and the statement "Investigated in Accordance with ANSI/SCTE 77-(issue date)."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BOXES, JUNCTION AND PULL (BGUZ)

GENERAL

This category covers sheet-metal boxes, cast-metal boxes, and nonmetallic boxes. These boxes are provided with a cover secured by fasteners other than hinges. All boxes in this category have a volume of more than 100 cu in. (1640 cm³). These boxes are intended for installation in accordance with Article 314 of ANSI/NFPA 70, "National Electrical Code" (NEC).

ENVIRONMENTAL RATINGS AND CONDITIONS

Each junction and pull box is marked with one or more of the following Enclosure Type ratings for which it was investigated: Type 1, 2, 3, 3X, 3R, 3RX, 3S, 3SX, 4, 4X, 5, 6, 6P, 12, 12K or 13. The intended uses for each Enclosure Type are as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

PVC junction and pull boxes are suitable for use with PVC rigid nonmetallic conduit. Such boxes are inherently resistant to atmospheres containing common industrial corrosive agents and will also withstand vapors or mists of caustics, pickling acids, plating baths, hydrofluoric and chromic acids.

Boxes marked as Type 2, 3R or 3RX enclosures may be marked to indicate the intended mounting orientation, or the location where electrical parts are intended to be installed, or both, where necessary to maintain the designated environmental rating.

Boxes marked as Type 3, 3X, 3S, 3SX, 4, 4X, 6, 6P, 12, 12K or 13 have integral mounting means external to the enclosure cavity or may have openings into the enclosure cavity for attachment of separate mounting means supplied with the enclosure or available as a kit referenced from enclosure markings.

CONDUIT CONNECTIONS

Cast-metal boxes suitable for field drilling and tapping of holes for conduit connections and mounting are marked to indicate the location and the trade sizes of the openings either on the box or on the packaging carton.

USE IN CONCRETE OR CINDER FILL

Cast-aluminum boxes suitable for use in concrete or cinder fill are marked to indicate this fact either on the box or on the packaging carton. These boxes may not be supplied with mounting means.

ELECTRICAL EQUIPMENT

Some boxes are intended for the installation of specific kinds of equipment; however, this category does not cover any electrical material or fittings contained in the box.

GROUNDING PROVISIONS

Metal boxes are intended to receive one of the equipment grounding conductors specified in Section 250.118 of the NEC and are provided with either a factory-supplied equipment grounding conductor terminal or instructions to obtain equipment grounding conductor terminal kit(s) available from the

BOXES, JUNCTION AND PULL (BGUZ)

manufacturer, or are marked to indicate the boxes are intended to be grounded by metal raceways or metallic cable sheaths.

RELATED PRODUCTS

Boxes intended to accommodate metering transformers are covered under Metering Transformer Cabinets (PIXS).
 Boxes intended for electric meter sockets are covered under Meter Sockets (PIYZ).
 Boxes provided with a door are covered under Cabinets and Cutout Boxes (CYIV).

Enclosures investigated for ingress protection in accordance with IEC 60529, "Degrees of Protection Provided by Enclosures (IP Code)," are covered under Degrees of Protection by Enclosures Classified in Accordance with IEC Publications (EOFI).

Enclosures intended for use with industrial control panels are covered under Industrial Control Panels (NITW).

Boxes having a volume of 100 cu in. or less are covered under Metallic Outlet Boxes (QCTI) or Nonmetallic Outlet Boxes (QCMZ).

Boxes intended for use with swimming pool luminaires are covered under Swimming Pool Junction Boxes (WCEZ).

Boxes intended for use aboard marine vessels are covered under Boxes, Junction and Pull, Marine (QCUP).

Boxes for use in hazardous (classified) locations are covered under Boxes, Junction and Pull for Use in Zone Classified Hazardous Locations (BGYM).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 50, "Enclosures for Electrical Equipment, Non-Environmental Considerations," and ANSI/UL 50E, "Enclosures for Electrical Equipment, Environmental Considerations."

UL MARK

The Listing Mark on the product or the UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Junction and Pull Box," "Junction Box," "Pull Box," "J&P," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BOXES, JUNCTION AND PULL FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (BGYM)

USE AND INSTALLATION

This category covers sheet-metal boxes, cast-metal boxes, and nonmetallic boxes intended for making wiring connections only.

All boxes covered under this category are for use with threaded rigid conduit or steel intermediate metal conduit, or other approved wiring methods in accordance with Section 505.15 of ANSI/NFPA 70, "National Electrical Code."

Boxes identified with an enclosure type designation are intended for use as indicated in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

Cast-metal boxes suitable for field drilling and tapping of holes for conduit connections and mounting are marked to indicate the location and the trade sizes of the openings either on the box or on the packaging carton.

Cast-aluminum boxes suitable for use in concrete or cinder fill are marked to indicate this fact either on the box or on the packaging carton. Such boxes are protected with asphalt-base paint or the equivalent.

Where field installation of certain kinds of equipment is acceptable, which may include terminals, jumpers, busbars, conduit fittings, etc., the installation instructions provided with the product will specify the type, number and mounting arrangements for the equipment to be installed.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standards used to investigate products in this category are ANSI/UL 50, "Enclosures for Electrical Equipment" (11th

BOXES, JUNCTION AND PULL FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (BGYM)

ed.), ANSI/UL 50, "Enclosures for Electrical Equipment, Non-Environmental Considerations" (12th ed.), and ANSI/UL 50E, "Enclosures for Electrical Equipment, Environmental Considerations."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Junction and Pull Box for Hazardous Locations," "Junction Box for Hazardous Locations" or "Pull Box for Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BRAKES, ELECTRIC FOR USE IN HAZARDOUS LOCATIONS (BHIX)

GENERAL

This category covers brakes intended primarily for holding purposes, but may be used for stopping light-inertia loads.

This category includes two types of electric brakes. One type is intended to be attached directly to a certified motor at the factory of the motor manufacturer in accordance with instructions provided by the brake manufacturer. The other type is provided with a mounting bracket and is coupled to the motor.

For Class I, Division 2 locations, the enclosure may be of the open or totally enclosed type. The Group designation is marked unless the brake is acceptable for Groups A, B, C and D. The brake is also marked with the operating temperature code designating the maximum internal or external surface temperature determined at rated full-load torque marked on the brake, if the temperature is greater than 100°C. If the enclosure incorporates one or more arcing or sparking parts, the part is housed in a Class I, Division 1 enclosure or the part is within a hermetically sealed enclosure, constructed with current-interrupting contacts immersed in oil, located in a nonincendive circuit or located in a purged and pressurized enclosure. If the brake is provided with an internal space heater, the space heater is intended to be wired in the control circuit such that the space heater is energized when the motor to which the brake is coupled is deenergized, and vice versa.

For Class II, Division 2 locations, the enclosure is of the totally enclosed type. The brake is marked with the operating temperature or operating temperature code designating the maximum full load external temperature determined at rated full-load torque (as marked on the brake), when operating in free air (not dust blanketed), if the external temperature is greater than 100°C.

The Certification Mark on a brake applies to the brake only, not to driving equipment, such as a motor.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations," or the requirements contained in UL Subject 1836, "Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2 and Class II, Division 2 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Brake for Hazardous Locations."

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BUILDING MATERIALS (BHWV)

DISCRETE PRODUCTS INSTALLED IN AIR-HANDLING SPACES (BHZF)

GENERAL

This category covers products installed in air-handling spaces (plenums) as defined in Article 300 of ANSI/NFPA 70, "National Electrical Code," Chapter 4 of ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," Section 602 of the "International Mechanical Code," and Section 602 of the "Uniform Mechanical Code." Heat- and smoke-release characteristics of these products are determined in accordance with UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces."

The test provides data with regard to peak rate of heat release, maximum peak normalized optical density and maximum average normalized optical density during fire exposure of the certified materials. Products complying with UL 2043 have demonstrated the following characteristics:

1. A peak rate of heat release of 100 kW or less
 2. A peak normalized optical density of 0.50 or less
 3. An average normalized optical density of 0.15 or less
- Authorities Having Jurisdiction should be consulted before installation.

RELATED PRODUCTS

Various discrete products, many containing electrical features, that are intended for installation in air-handling spaces are investigated in accordance with established electrical or other requirements, as well as UL 2043. These products or devices are so certified under the applicable product categories covering those products, as shown below:

Audio/Video Apparatus (AZSQ)
 Audio/Video Equipment (AZOE)
 Commercial Audio and Radio Equipment, Systems and Accessories (AZIX)
 Communication Technology Equipment (AZOJ)
 Communications-circuit Accessories (DUXR)
 Control and Communication Equipment (PGWM)
 Control Dampers (EIMZ)
 Electric Actuators (XABE or XABE2)
 Fluorescent Lamp Ballasts (FKVS)
 Hangers, Pipe (VFXI)
 Information Technology Equipment (AZOT)
 Information Technology Equipment Including Electrical Business Equipment (NWGQ)
 Outlet Boxes and Fittings Certified for Fire Resistance (CEYY or QBWY)
 Positioning Devices (ZODZ)
 Power Supplies, General Purpose (QQFU)
 Power Supplies, Specialty (QQII)
 Smoke-control-system Equipment (UUKL)
 Speakers (UEAY)
 Speakers and Amplifiers for Fire-protective Signaling Systems (UUMW)
 Suspended-ceiling-grid Low-voltage Lighting System Accessories (IFFC or IFFC2)
 Suspended-ceiling-grid Low-voltage Lighting Systems (IFFA or IFFA2)
 Telephone Appliances and Equipment (WYQQ)
 Through-penetrating Products (XHLY)

In general, the Codes noted under **GENERAL** above reference the use of UL 2043 for electrical equipment with combustible outer enclosures. Specifically, the "National Electrical Code" and the "International Mechanical Code" expressly state that electrical equipment with metal enclosures shall be permitted. Consequently, UL 2043 is not intended to apply to electrical equipment with metal outer enclosures unless otherwise specified by end-product-standard requirements.

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces."

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

AS TO HEAT RELEASE RATE AND SMOKE OPTICAL DENSITY ONLY Control No.

+ The product name or other appropriate product description as shown in the individual Classifications

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

Discrete Products Installed in Air-handling Spaces (BHZF)—Continued

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FIRE-RESISTANCE RATINGS (BXRH)

Fire resistance ratings are included for:

1. Assemblies, such as beams, floors, roofs, columns, and walls and partitions. These fire resistance designs provide the detailed construction of the assemblies and the components used.
2. Systems, such as construction joint systems, through-penetration firestop systems, electrical circuit protective systems and duct assemblies. These designs provide the detailed construction of the systems and the components used.
3. Opening protectives, such as dampers, fire doors, glazing and related equipment. Opening protectives are used to protect openings in fire resistance rated assemblies.

These materials are intended for use only in specific assembly or system designs as described in the general Guide Information for each product category and individual Listings, except for opening protectives. Opening protectives have been investigated for use as described in the instructions and markings provided with the opening protectives. The use of the materials and opening protectives in conditions other than described in the instructions, markings and the general Guide Information for the applicable product category has not been investigated by UL.

INVESTIGATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association (NFPA), and applicable model codes identified in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are investigated for the specifications or use conditions indicated in the general Guide Information for each product category.

These products are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

TECHNICAL SERVICE

Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.

Design Modifications

Careful consideration needs to be given to alterations or modifications of the fire resistance assemblies.

When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.

Contacting UL

UL provides assistance to users of fire resistance assemblies and products, which includes clarification of the published information.

UL also provides a service to investigate modifications to the fire resistance assemblies when requested by the design submitter. Requests for clarification should describe the change and include drawings, if necessary.

Requests for clarifications or investigations can be made by contacting UL at:

- Phone: +1 877-ULHELPS (+1 877-854-3577) x49590
- E-mail: archservices@ul.com
- UL's website: www.ul.com

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FIRE-RESISTANCE RATINGS - ANSI/UL 263 (BXUV)

Design Information Section

The Design Information Section supplements the individual published designs and is organized as follows:

- I. INTRODUCTION
- II. GENERAL
- III. FLOOR-CEILINGS AND ROOF-CEILINGS
- IV. BEAMS
- V. COLUMNS
- VI. WALLS AND PARTITIONS

I. INTRODUCTION

This category covers fire-rating Classifications based upon the test method and acceptance criteria in ANSI/UL 263 (ASTM E119 and NFPA 251), "Fire Tests of Building Construction and Materials." The ratings are expressed in hours and are applicable to floor-ceilings, roof-ceilings, beams, columns, walls and partitions.

The average furnace temperature from which these ratings are derived is 1000°F at 5 min., 1400°F at 15 min., 1550°F at 30 min., 1700°F at 60 min., 1850°F at 120 min., 1925°F at 180 min. and 2000°F at 240 min.

When a test assembly complies with the acceptance criteria, a detailed description of the assembly, its performance in the fire test and other pertinent details such as specification of materials, Classification coverage and alternate assembly details are included in a Report for the test sponsor. Sponsors may provide copies of the complete Test Report upon request. The Report also contains a summary of important features of the rated assembly. These summaries are also published in this Directory. Variations from the published specifications should be considered as not being investigated by UL.

NUMBERING SYSTEM FOR FIRE-RATED ASSEMBLIES

The prefix numbers with an asterisk (*) and the design numbers indicated as "Reserved" in the above table are for future expansion and to cater to new types of systems developed in the future.

+ SFRM denotes Spray-applied Fire-resistive Materials

1. Rapid Rise Fire Test

Fire-resistance designs for protecting structural members subject to petrochemical exposure fires are investigated to ANSI/UL 1709, "Rapid Rise Fire Tests of Protection Materials for Structural Steel," and are covered under Fire Resistance Ratings - ANSI/UL 1709 (BYBU). Systems complying with these requirements include an "XR" design prefix.

2. Definitions

Definitions of selected terms used to identify the types of protection referenced in the following Numbering System Table are:

Batts and Blankets — A category for a group of UL Classified products. The complete description of the products in the category and supplementary requirements for Classification are covered under Batts and Blankets (BZJZ).

Building Units — A category for a group of UL Classified products. The complete description of the products in the category and supplementary requirements for Classification are covered under Building Units (BZXX).

Concealed Grid System — Suspension system for acoustical material that is not visible from the occupied space.

Exposed Grid System — Suspension system for acoustical material that is visible from the occupied space.

Fire-resistant Joint System — An assemblage of specific materials or products rated in accordance with ANSI/UL 2079 to resist for a prescribed period of time, the passage of fire through joints between fire-resistance-rated assemblies. See Joint Systems (XHBN).

Insulating Concrete — Nonstructural concrete with a unit weight less than 60 pcf.

Membrane Penetration — An opening made through one side (wall, floor or ceiling membrane) of a fire-resistance-rated assembly.

Mineral and Fiber Boards — A category for a group of UL Classified products. The complete description of the products in the category and supplementary requirements for Classification are covered under Mineral and Fiber Boards (CERZ).

NUMBERING SYSTEM FOR FIRE-RATED ASSEMBLIES

Groups of Construction	TYPES OF PROTECTION								
	Membrane Protection						Direct Applied Protection		Unprotected
	000-099	100-199	200-299	300-399	400-499	500-599	600-699	700-899	900-999
Floors-Ceilings: A or B* Concrete and Cellular Steel Floor C - Glazing Systems	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Misc.	SFRM+	Unprotected
D, E* or F* Concrete and Steel Floor Units	Concealed Grid Sys.	(Reserved)	Exposed Grid System	Mineral and Fiber Boards	Metal Lath	Gypsum Board	Mastic and Intumescent Coatings	SFRM+	Unprotected
G or H* Concrete and Steel Joists	Concealed Grid Sys.	(Reserved)	Exposed Grid System	Mineral and Fiber Boards	Metal Lath	Gypsum Board	Misc.	SFRM+	Unprotected
I Non-load-bearing Horizontal Barrier	(Reserved)	(Reserved)	(Reserved)	(Reserved)	(Reserved)	Gypsum Board	(Reserved)	(Reserved)	(Reserved)
J or K Concrete	Concealed Grid Sys.	(Reserved)	Exposed Grid System	Mineral and Fiber Boards	Metal Lath	Gypsum Board	Misc.	SFRM+	Unprotected
L or M Wood Joist or Combination Wood and Steel Assemblies	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Misc.	SFRM+	Unprotected
Beams: N or O* for Floor-Ceiling	Concealed Grid Sys.	(Reserved)	Exposed Grid System	Batts and Blankets or Mineral and Fiber Boards	Metal Lath	Gypsum Board	Mastic and Intumescent Coatings	SFRM+	Unprotected
Roof-Ceiling: P, Q* or R*	Concealed Grid Sys.	(Reserved)	Exposed Grid System	Mineral and Fiber Boards	Metal Lath	Gypsum Board	Misc.	SFRM+	Unprotected
Beams: S or T* for Roof-Ceiling	Building Units	(Reserved)	Exposed Grid System	Mineral and Fiber Boards	Metal Lath	Gypsum Board	Mastic and Intumescent Coatings	SFRM+	Unprotected
Wall and Partition: U, V or W	Building or Partition Panel Units	(Reserved)	Insulating Concrete	Wood Stud, Gypsum Board, Lath &/or Plaster	Metal Stud, Gypsum Board, Lath &/or Plaster	Misc.	Metal Panels, Gypsum Board, Lath &/or Plaster	SFRM+	Masonry
Columns: X, Y or Z*	Building Units	Prefabricated	Mat Materials	Batts and Blankets or Mineral and Fiber Boards	Metal Lath & Plaster	Gypsum Board	Mastic and Intumescent Coatings	SFRM+	Masonry

Miscellaneous (Direct-applied Protection) — Various types of fire-resistive coating materials, including intumescent mastic and subliming coatings.

Miscellaneous (Wall and Partitions) — Various types of wall assemblies, including gypsum wallboard shaft walls, log walls, folding assemblies and assemblies with glazing materials.

Partition Panel Units — A category for a group of UL Classified Products. The complete description of the products in the category and supplementary requirements for Classification are covered under Units, Partition Panel (CJMR).

Prefabricated Building Columns — Structural building columns that include a fire-resistive protection system when delivered to the construction site. These products are Classified and identified as Prefabricated Building Columns (CGHT). The complete description of the products and supplementary requirements for Classification are covered under CGHT.

Through Penetration — An item such as a pipe, cable tray or duct that passes through a horizontal or vertical fire-resistive assembly.

Through-penetration Firestop Systems — An assemblage of specific materials rated in accordance with ANSI/UL 1479 (ASTM E814). Firestop systems maintain the fire containment integrity of horizontal or vertical fire-resistive assemblies where through penetrations are located. See Through-penetration Firestop Systems (XHEZ).

Unprotected Fire-resistive Assemblies — Assemblies that do not require direct applied coatings or suspended ceilings to protect the structural elements.

3. Numbering System

The summarized form of the test assembly is identified by an alphanumeric design number. The prefix letter designates the group of construction, the first number designates the type of protection and the other numbers and letters identify the particular assembly.

The prefix letters representing the various groups of constructions are:

Prefix Letters	Group of Construction
A	Floor-Ceiling Designs – Concrete with Cellular Steel Floor Units and Beam Support
D	Floor-Ceiling Designs – Concrete with Steel Floor Units and Beam Support
G	Floor-Ceiling Designs – Concrete and Steel Joists
J or K	Floor-Ceiling Designs – Precast and Field Poured Concrete
L	Floor-Ceiling Designs – Wood or Combination Wood and Steel Joist Assemblies
N	Beam Designs for Floor-Ceiling Assemblies
P	Roof-Ceiling Designs
S	Beam Designs for Roof-Ceiling Assemblies
U or V	Wall and Partition Designs
X or Y	Column Designs

II. GENERAL

The following information is appropriate to all fire-resistive designs described in this Directory. It is recommended that the users review this information in addition to the general guidelines provided for specific materials and construction types.

Authorities Having Jurisdiction should be consulted before construction.

Fire-resistance ratings apply only to assemblies in their entirety. Except for those separately rated structural members supporting tested assemblies, individual components are not assigned a fire-resistance rating and are not intended to be interchanged between assemblies but rather are designated for use in a specific design in order that the ratings of the design may be achieved.

All ratings are based on the assumption that the stability of structural members supporting the assembly are not impaired by the effects of fire. The extent of damage of the test assembly at the rating time is not a criteria for the rating.

The specifications for materials in an assembly are important details in the development of fire-resistance ratings. Those materials provided with an "*" in the design text are eligible to be produced under the Follow-Up Service Program of UL. Information identifying such materials and the Classified companies authorized to provide the materials are located in the product category section of this Directory. The appearance of the Classification Mark on the product is the only method provided by UL to identify products that have been produced under its Follow-Up Service.

1. Metric Dimensions

It is recommended that the Metric Guide for Federal Construction published by the National Institute of Building Sciences (NIBS) be consulted for guidance regarding the use of metric dimensioned building materials. The dimensional conversion of building materials from the inch-pound system to metric may either be hard or soft.

Hard conversions are typically applied to manufactured products used in modular construction. These products include suspended ceiling systems, gypsum wallboard, insulation boards, etc. Classified products which are available in metric sizes are identified in the Classification information for the individual product categories located near the end of this Directory.

For soft conversions, inch-pound dimensions are mathematically converted to exact equivalent metric values. Examples of dimensions which may be soft converted include concrete thickness, depth of concealed space above suspended ceilings and coating thicknesses.

It is recommended that dimensions which are identified as minimum or maximum in fire-resistive designs be initially softly converted and, if required, further converted to a hard metric equivalent following the min/max guidance. The spacing of hanger wire and other supports for suspended ceilings would be examples requiring this type of consideration.

2. Loading of Test Specimens

ANSI/UL 263 requires the load applied to test samples to be based upon the limiting conditions of design as determined by nationally recognized structural design criteria. For some applications, the nationally recognized design criteria may be based upon the Working Stress Design Method or the Limit States Design Method. For applications where these two design methods are available, the load applied to the test sample was determined in accordance with the Working Stress Design Method unless the rated assembly specifically references the Limit States Design Method. Also, unless otherwise stated, the load capacity of steel beams assumes the beams are fabricated from A36 steel.

ANSI/UL 263 permits samples to be tested with the applied load being less than the maximum allowable load as determined by the limiting conditions of a nationally recognized structural design criteria. The ratings for assemblies determined from tests where the applied load was less than allowed by the nationally recognized structural design criteria are identified as "Restricted Load Condition." The percent of the maximum load, the percent of the maximum stress, and the nationally recognized design criteria will be identified in text describing the structural element of rated assemblies with a restricted load condition. An example of the text used in an assembly with a Restricted Load Condition and steel joist loaded to 80% of the maximum allowable is:

The design load for the structural member described in this design should not: (1) exceed 80% of the maximum allowable load specified in "Catalog of Standard Specifications and Load Tables for Steel Joists and Steel Girders," published by the Steel Joist Institute, or (2) develop a tensile stress greater than 24 ksi, which is 80% of the maximum allowable tensile stress of 30 ksi. (Note: The maximum allowable total load develops a tensile stress of approximately 30 ksi.)

Some restricted-load conditions have resulted from changes in product availability. An example is the substitution of K-Series joists for other series joists as described under **Section III, FLOOR-CEILINGS AND ROOF-CEILINGS, Item 7, Steel Joists.**

3. Penetrations

Penetrations through all or a portion of an assembly can significantly affect the rating. Firestop systems developed to protect openings created by penetration items are covered in Volume 2 of the Fire Resistance Directory.

4. Finish Ratings

A finish rating is established for assemblies containing combustible (wood) supports. The finish rating is defined as the time at which the wood stud or wood joist reaches an average temperature rise of 250°F or an individual temperature rise of 325°F as measured on the plane of the wood nearest the fire. A finish rating is not intended to represent a rating for a membrane ceiling. The requirements for finish ratings are not included in ANSI/UL 263.

5. Nails and Screws

Nails are specified according to ASTM F547 or ASTM C514. Nails used to attach gypsum board to wood framing should be cement-coated box nails or cement-coated cooler nails unless specified otherwise in the specific designs. Screws meeting ASTM C1002 or ASTM C954 may be substituted for nails, one for one, when the head diameter, length, and spacing equal or exceed the requirements for the specified nails.

6. Interior and Exterior Applications

The fire-resistive designs and UL Classified materials are investigated with the understanding that their use is limited to interior applications unless otherwise specified in the design or Classification information (e.g., structural columns "Investigated for Exterior Use"). Where an exterior application of a UL Classified design is desired, the local building code and Authority Having Jurisdiction should be consulted to ensure compliance with other code requirements applicable to exterior use.

7. Exposed Interior Finishes

The surface flammability and smoke development characteristics of Classified materials that may be used as exposed interior finishes are measured by the test method in ANSI/UL 723 (ASTM E84 and NFPA 255), "Test for Surface Burning Characteristics of Building Materials." The flame spread index of these materials is less than 200 and the smoke develop-

ment index of these materials is less than 450. Surface Burning Classifications are contained in the Building Materials Directory.

8. Radiant Heating Cable

The effect of the use of electrical radiant heating cable or wire on the fire-resistance performance of assemblies has not been investigated.

9. Coating Materials

Coating materials include products identified as: 1) Spray-applied Fire-resistant Materials and 2) Mastic and Intumescent Coatings.

The type of material is specified in each design. Materials that have been investigated for exterior application are so indicated in the individual designs and in the product category.

Regulations governing the application and use of coating materials have been promulgated by many governmental agencies. Authorities Having Jurisdiction should be consulted for current local requirements.

Unless specifically detailed in a design or in the product certification information, the interaction of dissimilar fireproofing materials on the same structural element or at the intersection of structural members, and the adherence of one product to the other, has not been investigated under fire-test conditions.

Unless specifically detailed in a design or in the product certification information, the impact of galvanization applied to structural steel members has not been investigated under fire-test conditions. Galvanization may impact the adhesion of spray-applied fire-resistive materials or mastic and intumescent coatings.

Spray-applied Fire-resistive Materials

The surfaces on which the material is to be applied must be free of dirt, oil and loose scale. Surfaces may be primed with the primers/paints covered under Primers for Structural Steel (CGJM).

The following method of determining the bond strength of the spray-applied materials only applies to primers or paints that are not covered under Primers for Structural Steel (CGJM). Unless specifically prohibited in a design, materials identified as Spray-applied Fire-resistive Materials (CHPX) may be applied to primed or similarly painted wide-flange steel shapes and pipe and tube-shaped columns provided: (A) the beam flange width does not exceed 12 in.; (B) the column flange width does not exceed 16 in.; (C) the beam or column web depth (defined as inside of top flange to inside of bottom flange) does not exceed 16 in.; (D) the pipe outer diameter or tube width does not exceed 12 in.; (E) bond tests conducted in accordance with ASTM E736, "Standard Test Method for Cohesion/Adhesion of Sprayed Fire Resistive Materials Applied to Structural Members," should indicate a minimum average bond strength of 80% and a minimum individual bond strength of 50% when compared to the bond strength of the fire-resistive coating as applied to clean uncoated 1/8 in. thick steel plate. The average and minimum bond strength values should be determined based upon a minimum of five bond tests conducted in accordance with ASTM E736.

The bond tests need only be conducted when the fire-resistive coating is applied to a primed or similarly painted surface for which acceptable bond strength performance between the primer or other similar material and the fire-resistive coating has not been measured. A bonding agent may be applied to the primed or similarly painted surface to obtain the minimum required bond strength where the bond strengths are found to be below the minimum acceptable values.

As an alternative to the bond test conducted on control samples applied to an uncoated steel plate, the following method may be used for unknown coatings in existing structures. Sections of painted steel are to be coated with a bonding agent compatible with the sprayed material being used on the project. The treated and untreated substrates should be coated with material, cured and subjected to five bond tests each, in accordance with ASTM E736. If the failure mode of the sections treated with the bonding agent is 100% cohesive in nature, it will be acceptable to use this bond test value as the control bond strength. The value obtained on the untreated painted section should be compared to the control value using the minimum 80% average, 50% individual bond strength acceptance criteria established in ASTM E736.

If condition (E) is not met, a mechanical bond may be obtained by wrapping the structural member with expanded metal lath (minimum 1.7 lbs per sq yd).

If any of the conditions specified in (A), (B), (C) or (D) are not met, a mechanical break should be provided. A mechanical break may be provided by mechanically fastening one or more minimum 1.7 lbs per sq yd metal lath strips to the flange, web or tube and pipe surface either by weld, screw, or powder actuated fasteners, on maximum 12 in. centers, on each longitudinal edge of the strip, so that the clear spans do not exceed the limits established in conditions (A), (B), (C) or (D) as appropriate. No less than 25% of the width of the oversize flange or web element should be covered by the metal lath. No strip of metal lath should be less than 3-1/2 in. wide.

As an alternative to metal lath, the mechanical break may be provided by the use of minimum No. 12 gauge steel studs with minimum No. 28 gauge galvanized steel disks if such a system is described in a specific design (usually bottomless trench in an electrified floor design) for the fire-resistive coating being applied. The studs should be welded to the oversize element in rows such that the maximum clear span conforms to conditions (A), (B),

(C) or (D) as appropriate. The spacing of studs along each row should not exceed 24 in. and a minimum one stud per 256 sq in. should be provided.

Where metal lath strips or steel studs and disks are used, acceptable bond strength as described in item (E) should also be provided. A bonding agent may be applied to the painted surface to obtain the required minimum bond strength where bond strengths to a painted surface are found to be below minimum acceptable values.

The dry density at which sprayed material should be applied to building elements is specified on the individual designs. Dry-density measurements may be determined by removing at least 6 in. sq sections randomly selected from the building, subjecting the samples to 120°F in an oven until constant weight is obtained, followed by accurate weighing, measuring and calculation of the density in lb per cu ft. Constant weight is usually obtained after 24 to 48 h exposure within a 120°F oven.

The spray-applied fire-resistive material thickness specification in a design should be considered the minimum average thickness of the individual thickness readings measured in accordance with ASTM E605, "Standard Test Methods for Thickness and Density of Sprayed Fire Resistive Material Applied to Structural Members." When spray-applied fire-resistive material is applied to metal lath, the spray-applied fire-resistive material thickness should be measured to the face of the lath unless specified otherwise in the design.

Individual measured thickness, which exceeds the thickness specified in a design by 1/4 in. or more should be recorded as the thickness specified in the design plus 1/4 in. For design thicknesses 1 in. or greater, the minimum allowable individual thickness should be the design thickness minus 1/4 in. For design thicknesses less than 1 in., the minimum allowable individual thickness should be the design thickness minus 25%.

The thickness of the spray-applied fire-resistive material should be corrected by applying additional material at any location where: (1) the calculated average thickness of the material is less than that required by the design or (2) an individual measured thickness reading is more than 1/4 in. less or more than 25% less (for design thicknesses greater than 1 in. and less than 1 in., respectively) than the specified thickness required by the design.

Areas of the structural frame and/or floor area are to be selected to obtain representative average thicknesses. Thickness readings on the floor or wall area are to be taken symmetrically over the selected area. The average of all measurements is to be considered the average thickness of the area. Thickness measurements on beams and/or columns are to be made around the member at sections within 12 in. of each other. The average thickness is to be considered the average of the readings taken at both sections.

Screw tips penetrating the steel roof deck in all P700 and P800 series designs require spray-applied fire-resistive material. The spray-applied fire-resistive material specified in the design should be applied to cover the tips at a minimum thickness of 1/2 in.

Mixing and spraying instructions are included with each container of material.

Mastic and Intumescent Coatings

The surfaces on which the material is to be applied must be free of dirt, oil and loose scale. The Classification information for materials identified as Mastic and Intumescent Coatings (CDWZ) should be consulted for specific recommendations regarding the application of the coating over primed painted surfaces.

The mastic and intumescent coating thickness specification in a design should be considered the minimum average thickness of the individual thickness readings measured in accordance with Technical Manual 12-B, "Standard Practice of the Testing and Inspection of Field Applied Thin-Film Intumescent Fire Resistive Materials; an Annotated Guide," published by the Association of the Wall and Ceiling Industries.

The mastic and intumescent coating average thickness should not exceed the maximum thickness published in the individual designs and no individual thickness measurement should be less than 80% of the thickness specified design.

Mixing and spraying instructions are included with each container of material.

When mastic and intumescent coatings are exposed to fire, they expand and form an insulating char. Unless otherwise detailed in the individual designs, mastic and intumescent coatings are tested without any covering adjacent to the tested member that might interfere with the expansion of the coating. The effect on the fire-resistance rating of steel members (beams, columns, etc.) caused by any covering that would interfere with the expansion of a mastic and intumescent coating during a fire has not been investigated. Contact the manufacturer for their required clearance around structural members protected with mastic and intumescent coatings.

10. Gypsum Board

Vertically applied gypsum board is gypsum board that is applied with the long edges parallel to the framing members to which it is attached. Horizontally applied gypsum board applied is gypsum board applied with the long edges perpendicular to the framing members to which it is attached.

Gypsum board thicknesses specified in specific designs are minimums. Greater thicknesses of gypsum board are permitted as long as the fastener

length is increased to provide penetration into framing that is equal to or greater than that achieved with the specified gypsum board thickness and fasteners.

Additional layers of gypsum board are permitted to be added to any design.

For designs containing the statement "See Gypsum Board (CKNX) Category for names of Classified Companies," any product in the category (CKNX) that meets the specifications described in the individual design may be used. This statement is applicable to any gypsum board manufacturer who produces Classified gypsum board meeting all requirements specified in the individual design. It is not required that these Design Numbers appear in the individual company's Classification found in the (CKNX) category.

11. Gypsum Board Joint Treatment (Fire Taping)

Unless otherwise specified in the specific design all gypsum board systems except those with predecorated or metal covered surfaces have joints taped and joints and fastener heads covered with one coat of joint compound (fire taped). Base layers in multi layer systems are not required to have joints or fastener heads taped or covered with joint compound.

12. Plaster

The proper aggregate and mix proportions are specified on each design. Thicknesses are measured from the outer face of the plaster base. When a finish coat is not specified, it is not included in the thickness dimensions, but it may be added. Materials investigated for exterior application are so indicated on the individual designs.

13. Dampers

Building codes include requirements for four types of dampers: fire dampers, smoke (leakage rated) dampers, ceiling dampers, and corridor dampers. Dampers have been investigated for installation in wall or ceiling constructions in the maximum sizes and orientations (vertical or horizontal) indicated in their Listing. Dampers have been investigated for the following applications:

Fire Dampers are included in Volume 3 of this Directory and are intended for use where air ducts and air transfer openings traverse fire-resistance-rated walls and floors.

Leakage-rated (Smoke) Dampers are included in Volume 3 of this Directory and are intended for use where air ducts and air transfer openings traverse smoke barriers.

Corridor Dampers are included in Volume 3 of this Directory and are intended for use where air ducts penetrate or terminate at horizontal openings in the ceilings of certain corridors, as required by the building code.

Ceiling Dampers are included in this Directory (see CABS) and are intended to function as a heat barrier in air-handling openings penetrating fire-resistive membrane ceilings. Additional details on duct outlet protection methods for membrane ceiling constructions, designated Systems A and B, is included under **Section III FLOOR-CEILINGS AND ROOF-CEILINGS, Item 17, Air Ducts and Protection Systems.**

14. Wood Structural Panel

Wood Structural Panel is a structural panel product composed primarily of wood and meeting the requirements of the U.S. Department of Commerce Voluntary Product Standard PS 1, Construction and Industrial Plywood or the U.S. Department of Commerce Voluntary Product Standard PS 2, Performance Standard for Wood-Based Structural-Use Panels. Wood structural panels include all-veneer plywood, composite panels containing a combination of veneer and wood-based material, and mat-formed panels such as oriented strand board and waferboard. The panels are to bear the label of a code recognized certification organization with a specific reference to the PS 1 or PS 2 standard. The panels are also marked Exposure 1 or Exterior. Some individual designs may limit the type of panel that can be used.

As an alternate, wood structural panels investigated in accordance with APA - The Engineered Wood Association Standard PRP-108, Performance Standards and Policies for Structural-Use Panels, or the PFS Research Foundation Standard PRP-133, Performance Standards and Policies for Wood-Based Structural-Use Panels, and meeting the description for the panel type in the individual designs, may be used.

15. Sound Transmission Class (STC)

In addition to the fire-resistance ratings, where indicated in the individual designs, the Sound Transmission Class (STC) rating is published for those designs where the sound transmission loss (STL) test was also investigated. ASTM E90 (2009), "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements," is the test method used to evaluate the sound transmission loss for the various designs. The STC rating applies to the assembly of materials as indicated in the individual designs.

16. Impact Insulation Class (IIC)

In addition to the fire-resistance ratings, where indicated in the individual designs, the Impact Insulation Class (IIC) rating is published for those designs where the impact noise test was also investigated. ASTM E492 (2009), "Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the

Tapping Machine," is the test method used to evaluate the impact noise of the design. The IIC rating applies to the assembly of materials as indicated in the individual designs.

17. Curtain Wall/Floor Protection Systems

The category Perimeter Fire Containment Systems (XHDG) includes designs that have been investigated to protect the void created at the intersection of a fire-rated floor assembly and an exterior curtain wall assembly.

18. Fire-resistant Joint Systems

The category Joint Systems (XHBN) includes designs that have been investigated to protect the joints between fire-resistance-rated walls, floors, floor-ceiling assemblies and roof-ceiling assemblies.

19. Fire Doors, Frames and Hardware

Product categories associated with fire doors, frames and associated hardware are included in Volume 3 of this Directory. See Product Category index (GSNV). This includes leakage-rated products investigated to limit the spread of smoke through these assemblies.

20. Glazing, Wired Glass and Glass Blocks

The product category Fire-protection-rated Glazing Materials (KCMZ) contains information on wired glass and nonwired glazing investigated for fire resistance. The product category Glass Blocks (KCJU) contains information on glass blocks investigated for fire resistance.

III. FLOOR-CEILINGS AND ROOF-CEILINGS

The following guidelines are directed towards the materials and construction methods described for floor-ceiling and roof-ceiling assemblies. These guidelines are intended to supplement the specific description included with each design.

Specific guidelines for the application of beam designs to floor-ceiling and roof-ceiling assemblies are provided in this Directory under the heading entitled "Beams."

1. Concrete

The concrete compressive strength specified in the designs may be reduced 500 psi to obtain the minimum value. The maximum compressive strength is not limited. The thickness is a minimum unless otherwise indicated.

The concrete's air dry unit weight is determined in accordance with ASTM C567. The unit weight specifications (unless stated as a range for individual designs) have a tolerance of plus or minus 3 pcf. If normal weight concrete (145 to 155 pcf) is specified, the use of lightweight (90 to 120 pcf) is not recommended because its greater insulating properties could cause higher temperatures on supporting members. When lightweight concrete is specified, the use of normal weight concrete is not recommended because its lower insulating properties could cause higher unexposed surface temperatures.

2. Fiber Reinforcement

Classified synthetic fiber reinforcements may be added to the concrete mix for the purpose of controlling shrinkage cracks.

These fibers are not intended to satisfy any structural requirements. The structural capacity of the concrete slab should be maintained in accordance with the requirements of the ACI building code.

3. Steel Floor and Form Units

The type of unit and the minimum steel thickness is specified in each design.

The steel floor and roof deck minimum thickness table is based upon an industry standard for steel deck. The load tables published by the steel deck industry are based upon the design thickness and a 5% tolerance is applied to derive the minimum thickness. The tolerance is in accordance with AISI specifications. For steel floor and roof deck, the minimum bare metal thickness should be as follows:

Gauge	Design Thkns In.	Min Thkns Bare Metal In.
28	0.0149	0.014
26	0.0179	0.017
24	0.0238	0.023
22	0.0295	0.028
20	0.0358	0.034
18	0.0474	0.045
16	0.0598	0.057

The effect on the fire resistance of the assembly when cellular sections are used as air-handling units has not been investigated.

Some steel units are provided with patterned indentations and are thereby considered to act compositely with the concrete topping. Moment and shear capacities are usually determined empirically from structural tests. The allowable load is provided in the manufacturer's catalogs. The loading for floors with noncomposite units (without indentations) is based on their section modulus. Some fire tests have been conducted on slabs utilizing the composite units but with the loading based on the section modulus of the steel. In such cases the design will specify noncomposite loading. Fire tests have generally shown that composite slabs deflect more than similar noncomposite slabs. Therefore, the ratings developed with

composite units would not be jeopardized if noncomposite units of the same profile are used provided the loading is based on the section modulus of the noncomposite units.

The steel form units used in floor or roof assemblies may be painted or galvanized when used in designs that include suspended ceilings (Designs G0-, G2-, G4-, G5-, P0-, P2-, P4-, P5-). In designs which specify the steel form units to be welded to supports with welding washers, the welding washers may be omitted when the steel form unit is 22 MSG gauge or heavier.

Normally, assemblies with steel deck are constructed and tested with simple span conditions, however, the ratings also apply to continuous span conditions.

4. Electrical Boxes for Concrete Floors

The category Outlet Boxes and Fittings Classified for Fire Resistance (CEYY) covers pre-set and post-set inserts for use in concrete floors for electrical and communication connections. These devices have demonstrated an ability to be used in specific assemblies without reducing their fire-resistive ratings. In those floor-ceiling designs where the inserts are not specifically shown, penetrations to the concrete topping with electrical inserts may jeopardize the rating unless proper compensating protection is provided. In the absence of specific information for inserts in individual designs, inserts which do not penetrate through the entire floor and bear the UL Classification Mark for Outlet Boxes and Fittings Classified for Fire Resistance may be used in floor-ceiling designs which include fire-resistive coating materials on both fluted and cellular floor units for the entire floor span between supports. The cellular units should be protected in one of the following ways:

1. For inserts that penetrate into the top of the cell and where concrete is not removed from the valleys of the steel floor units, the thickness of fireproofing material specified below standard trench headers (with bottom pan) is applicable.
2. For inserts that penetrate into the sides of the cells with no concrete in the valley between the cells under the inserts, the thickness of the fire-resistive coating specified below the bottomless trench header (without bottom pan) is applicable.

The above recommended protection is intended only for structural concrete floors which contain welded wire fabric or fiber reinforcement when permitted and consist of a blend of one or more fluted to one cellular unit. The entire underside of the cellular units should be protected with the same material and thickness as required below the trench headers with a gradual reduction in thickness to that specified for fluted units in the designs. The spacing between inserts should be sufficient for structural integrity. The diameter of any holes in the insert cover for the passage of wire should be no more than 1/8 in. larger than the diameter of the wire.

5. Nonmetallic Outlet Boxes for Ceilings

Nonmetallic outlet boxes investigated for installation in floor-ceiling or roof-ceiling assemblies are included in Outlet Boxes and Fittings Classified for Fire Resistance (CEYY).

6. Metallic Electrical Outlet Boxes

Listed metallic outlet boxes with metallic or nonmetallic cover plates may be used in floor-ceiling and roof-ceiling assemblies with ratings not exceeding 2 hours. These assemblies should have gypsum wallboard membranes. The metallic outlet boxes should be securely fastened to the joists and the opening in the wallboard facing should be cut so that the clearance between the box and the gypsum wallboard does not exceed 1/8 in. The surface area of individual boxes should not exceed 16 sq. in. The aggregate surface area of the boxes should not exceed 100 sq. in. per 100 sq. ft of ceiling surface.

7. Steel Joists

The specified minimum size joist in floor- or roof-ceiling designs is the joist that meets the requirements for both the minimum depth and the minimum weight per foot. Joists that exceed the specified minimum size may be used, provided the accessories are compatible. The dimension from the bottom chord of joists to the ceiling, whether given or calculated, is a minimum.

Spacing between joists may be increased from that specified to a maximum of 4 ft on centers if the floor slab meets structural requirements and the spacing of the hanger wires supporting the ceiling is not increased. Where it is necessary to provide support for the ceiling hanger wires between the joists, this may be accomplished by using 1-1/2 in., No. 16 gauge or larger cold-rolled steel channels. Each channel with its web oriented vertically should be placed on top of and perpendicular to the joist's bottom chord and tied thereto with a double strand of No. 18 SWG galvanized steel wire.

The area of bridging bars or angles specified in the individual designs is a minimum. Larger bridging may be necessary in order to meet the structural and/or code requirements.

For designs requiring application of coating materials to steel joists, the bridging bars or angles should be protected with the coating material thickness required on the joist for a minimum distance of 12 in. beyond the joist.

When the joists are coated with a fire-resistive material, the cavities, if any, between the upper flange of the joist and the steel floor or roof units should be filled with the fire-resistive coating material applied to the joist, unless specified otherwise in the individual design.

For designs that require the bottom chords of the joists to consist of round bars, the substitution of angles of an equivalent area is not recommended.

K-Series joists, LH-Series joists and joist girders specified in floor- or roof-ceiling assemblies should be designed and fabricated in accordance with the Steel Joist Institute's Specifications adopted November 4, 1985, and revised May 1, 2000.

K-Series joists may be substituted for other joists specified in floor- or roof-ceiling designs as follows:

Floor-Ceiling Assemblies

K-Series joists of equal or greater depth and weight per foot may be substituted for any S-, J-, H-, LH- and/or DLH-Series joists in any floor-ceiling design, which employs a structural concrete floor and a suspended membrane ceiling.

Roof-Ceiling Assemblies

K-Series joists of equal or greater depth and weight per foot may be substituted for any S-, J-, H-, LH- and/or DLH-Series joists in any roof-ceiling design, with the following restrictions:

- a) Minimum Nominal Depth = 10 in.
- b) Maximum Tensile Stress = 26,000 psi.

Any stress limitation specified in floor or roof designs containing S-, J-, H-, LH- and/or DLH-Series joists should remain applicable when a K-Series joist is substituted.

When a K-Series joist is substituted, any restriction regarding minimum allowable joist member sizes, areas of steel, and/or bridging material sizes remain applicable. Refer to section "Fire-Resistance Ratings with Steel Joists" in the Standard Specifications Load Tables & Weight Tables for Steel Joists and Joist Girders, 41st edition, published by the Steel Joist Institute, for guidance.

8. Precast Concrete Units

For restrained assembly ratings, some designs require end clearances and lateral expansion joints with the use of noncombustible compressible materials along the sides of the precast concrete units. This requirement may be waived and the clearance spaces filled with sand-cement grout if the stiffness of the building floor and supporting column system surrounding the precast concrete units does not exceed 80% of the stiffness of the test frame in which the assemblies are tested and rated.

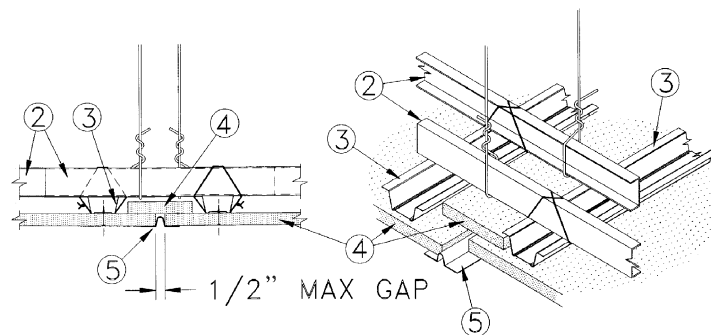
The relative stiffness of the frame work surrounding a building floor assembly may be calculated using an approximate test frame size of 14 ft by 17 ft and an approximate stiffness of frame of 700,000 KIP-in. and 850,000 KIP-in., expressed by EI/L, along the 17 ft and 14 ft dimensions, respectively.

For unrestrained assembly ratings, clearances should be provided around the ends and sides of the precast concrete units so that they may expand freely during fire exposure.

In most floor-ceiling designs, sand-cement grout is required to be poured between adjacent precast units. This grout may be omitted if a minimum 1 in. thick concrete topping is placed over the precast concrete units.

9. Ceiling Control Joints

For G500, L500 and M500-Series floor-ceiling designs having a maximum 1 hr Unrestrained Assembly Rating and having a ceiling membrane consisting of a single-layer of nominal 5/8 in. thick gypsum wallboard, max 1/2 in. wide control joints may be incorporated in the ceiling using one of the following methods:



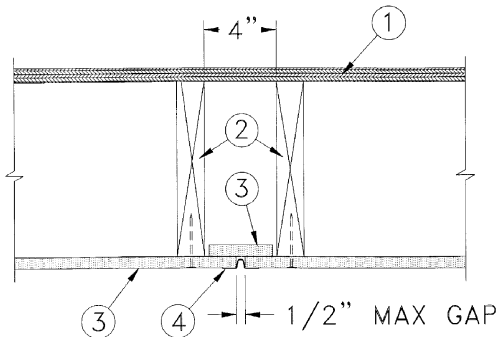
Ceiling Suspended Below Floor Assembly

1. **Floor Assembly — (Not Shown)** — The floor assembly should be constructed of the materials and in the manner described in the individual G-500, L500 or M500-Series Floor-Ceiling design.
2. **Cold-Rolled Steel Channel** — Nom 1-1/2 in. deep, min 16 gauge cold-rolled steel channels installed perpendicular to control joint direction. Channels suspended from floor joists with 12 SWG galv steel hanger wires. Hanger wires spaced max 48 in. OC. Channels spaced max 24 in. OC. Channels installed to extend approx 6 in. past control joint location with channels on opposite sides of control joint offset from each other. Hanger wire at end of each channel to be located in span between furring channels over control joint location.
3. **Furring Channels** — Nom 7/8 in. deep, min 25 gauge painted or galv steel rigid furring channels installed perpendicular to cold-rolled steel

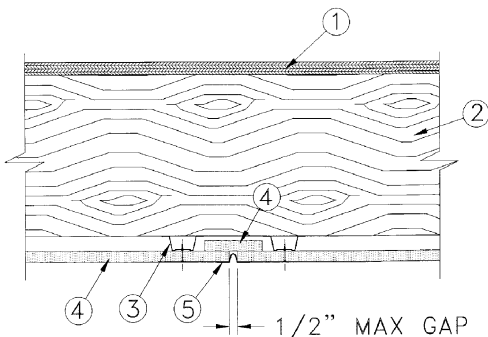
FIRE-RESISTANCE RATINGS - ANSI/UL 263 (BXUV)

channels and spaced max 16 in. OC. Furring channel along each side of ceiling control joint to be located with its centerline 3 in. from the center of the control joint. Furring channels secured to cold-rolled steel channels with a double strand of 18 SWG galv steel wire.

- Gypsum Board** — Installed with long dimension perpendicular to furring channels. Gypsum wallboard type, fastener type and fastener spacings to be as specified in the individual L500-Series Floor-Ceiling design. Max width of control joint centered between furring channels is 1/2 in. Strip of gypsum wallboard over control joint to be nom 5/8 in. thick by 3-1/2 in. wide and to be secured to ceiling along only one side of control joint with 1-1/2 in. long Type G wallboard screws spaced max 24 in. OC.
- Control Joint** — Vinyl or zinc control joint conforming to ASTM C1047, "Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base." Control joint stapled to gypsum wallboard on each side of joint opening prior to finishing of ceiling.

**Control Joint Parallel With Wood Joists**

- Flooring** — Lumber or plywood subfloor with finish floor of lumber, plywood or floor-topping mixture as specified in the individual L500 or M500-Series Floor-Ceiling design.
- Wood Joists** — 2 by 10 in., spaced 4 in. apart at the control joint location and max 16 in. OC away from control joint as specified in the individual L500 or M500-Series Floor-Ceiling design.
- Gypsum Board** — Installed with long dimension perpendicular to wood joists. Gypsum wallboard type, fastener type and fastener spacings to be as specified in the individual L500-Series Floor-Ceiling design. Max width of control joint centered between wood joists is 1/2 in. Strip of gypsum wallboard over control joint to be nom 5/8 in. thick by 3-1/2 in. wide and to be secured to ceiling along only one side of control joint with 1-1/2 in. long Type G wallboard screws spaced max 24 in. OC.
- Control Joint** — Vinyl or zinc control joint conforming to ASTM C1047. Control joint stapled to gypsum wallboard on each side of joint opening prior to finishing of ceiling.

**Control Joint Perpendicular to Wood Joists**

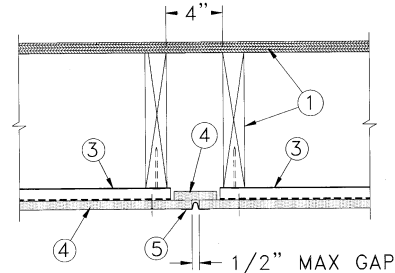
- Flooring** — Lumber or plywood subfloor with finish floor of lumber, plywood or floor-topping mixture as specified in the individual L500 or M500-Series Floor-Ceiling design.
- Wood Joists** — 2 by 10 in., spaced max 24 in. OC as specified in the individual L500 or M500-Series Floor-Ceiling design.
- Furring Channels** — Nom 7/8 in. deep, min 25 gauge painted or galv steel rigid furring channels installed perpendicular to wood joists and spaced max 16 in. OC. Furring channel along each side of ceiling control joint to be located with its centerline 3 in. from the center of the control joint. Furring channels secured to wood joists as specified in the individual L500-Series Floor-Ceiling design.
- Gypsum Board** — Installed with long dimension perpendicular to furring channels. Gypsum wallboard type, fastener type and fastener spacings to be as specified in the individual L500-Series Floor-Ceiling design. Max width of control joint centered between furring channels

FIRE-RESISTANCE RATINGS - ANSI/UL 263 (BXUV)

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is 1/2 in. Strip of gypsum wallboard over control joint to be nom 5/8 in. thick by 3-1/2 in. wide and to be secured to ceiling along only one side of control joint with 1-1/2 in. long Type G wallboard screws spaced max 24 in. OC.

- Control Joint** — Vinyl or zinc control joint conforming to ASTM C1047. Control joint stapled to gypsum wallboard on each side of joint opening prior to finishing of ceiling.

**Control Joint Parallel with Wood Joists**

- Flooring** — Lumber or plywood subfloor with finish floor of lumber, plywood or floor-topping mixture as specified in the individual L500 or M500-Series Floor-Ceiling design.
- Wood Joists** — 2 by 10 in., spaced max 24 in. OC as specified in the individual L500 or M500-Series Floor-Ceiling design.
- Furring Channels** — Nom 7/8 in. deep, min 25 gauge painted or galv steel rigid furring channels installed perpendicular to wood joists and spaced max 16 in. OC. Furring channels to cantilever approx 1/4 in. beyond wood joist in 4 in. wide joist cavity containing control joint. Furring channels secured to wood joists as specified in the individual L500-Series Floor-Ceiling design.
- Gypsum Board** — Installed with long dimension perpendicular to furring channels. Gypsum wallboard type, fastener type and fastener spacing to be as specified in the individual L500-Series Floor-Ceiling design. Max width of control joint centered in 4 in. wide joist cavity is 1/2 in. Strip of gypsum wallboard over control joint to be nom 5/8 in. thick by 3 in. wide and to be secured to ceiling along only one side of control joint with 1-1/2 in. long Type G wallboard screws spaced max 24 in. OC.
- Control Joint** — Vinyl or zinc control joint conforming to ASTM C1047. Control joint stapled to gypsum wallboard on each side of joint opening prior to finishing of ceiling.

10. Acoustical Material

The type and size is specified in each design. Where a range of panel sizes is indicated, compatible sizes of suspension members must be used. Designs incorporating lay-in acoustical ceiling panels specify the use of hold-down clips. Hold-down clips are required for assemblies incorporating ceiling panels weighing less than 1 lb per square foot.

11. Suspension Systems

The type and size of the suspension system are specified on the design. Support of the system is an important feature in its performance. Spacing of the supports should not exceed but may be less than specified. When the length of cross tee between the main runner and the wall molding is 30 in. or longer, each such cross tee should be supported by a hanger wire at midpoint of the tee or at a location nearer the wall unless specified differently in the design.

As an alternate to the wall molding specified in the designs, the molding may be an angle fabricated from minimum 0.017 in. thick steel. Each leg of the angle should be at least 7/8 in. long with a 0.115 in. hemmed edge. The wall molding should be reliably secured to the wall with steel fasteners on maximum 16 in. centers unless specified otherwise in a design.

Cross tees which are parallel and adjacent to walls and are spaced 12 in. or less from the wall should each be supported by a hanger wire at midpoint. These hanger wires are intended to minimize their rotation under fire conditions due to the unbalanced weight of panels on their flanges.

Where a ceiling is supported directly from structural members, it may be lowered and intermediate supports may be used, if necessary, provided they produce an in place stiffness equivalent to that of the originally tested elements. A suggested method for providing an equivalent in place stiffness is by use of 1-1/2 in. cold-rolled channels made of No. 16 gauge or heavier painted or galvanized steel, with the web oriented vertically and suspended from the structural members by No. 12 SWG or heavier galvanized steel wire at a maximum spacing of 48 in. OC. The channels may be oriented parallel or perpendicular to the structural members but should be spaced not more than the spacing of the members.

Where it is necessary to cut away the expansion mechanism of suspension members to fit room dimensions or corridor widths, the member is to be installed with a gap of approximately 1/10 in. per ft of length to permit free thermal expansion.

Hanger wires should be installed vertically unless permitted otherwise in a design.

Some floor-ceiling designs with structural concrete topping on steel floor units specify the use of steel hanger clips as an attachment provision for hanger wires. As an alternate to hanger clips, low-velocity, powder-actuated, steel-eye pin fasteners may be used for hanger wire attachment in the floor-ceiling designs. The fasteners should have a minimum 5/32 in. diameter by minimum 7/8 in. long pointed shank with a washer and nominal 7/8 in. long by 7/16 in. wide head containing a rounded slot opening. The fasteners are intended to be secured to concrete in valleys of fluted steel floor units with powder charges sufficient to fully embed the shank portion without shattering the concrete.

12. Fluorescent Recessed Luminaires

Luminaires may be installed individually or end to end (in rows). Side-by-side installation has not been investigated.

The spacing of luminaires specified in the designs refers to the maximum aggregate area of the luminaires to be used in each 100 sq ft of ceiling. Unless specified differently, the luminaires are of the fluorescent lamp type with steel housing and hardware.

Where air-handling type luminaires were tested, the design may describe the luminaire as air handling or as provided with slots in the housing. However, since no air movement was employed during the test, the ratings require that air movement be effectively stopped at the start of a fire. Air-handling luminaires may be used in any design that specifies luminaires, provided it is not necessary to alter the enclosure surrounding the luminaire and that provisions are made for effectively stopping the movement of air at the start of a fire.

In ceilings employing an exposed grid suspension system, when hanger wire is required at midpoint of the cross tee on each side of luminaires, the wire should be installed with approximately 1/8 in. of slack such that it will not be pulling on the cross tee at room temperature conditions.

13. Enclosures for Fluorescent Recessed Luminaires

Enclosures for luminaires should be spaced away from the top of luminaire housing as shown on individual designs. When luminaires are installed end to end, one end piece of the protection material that is part of the enclosure should be placed on top of the adjoining top protection pieces to cover the gap at the junction of the luminaires. Spacers placed on top of the luminaire housing to provide clearance for the protection material should not be located directly over or adjacent to luminaire ballasts. Installation is intended to be in conformance with ANSI/NFPA 70, "National Electrical Code." For lay-in panel ceilings, as an alternate to the spacers cut from ceiling material or mineral wool batts, pieces of ceiling suspension system tees may be used to maintain the clearance between the protection material and the top of the luminaire.

14. Luminaires Classified for Fire Resistance

In addition to the luminaires described above, luminaires specifically investigated for installation in floor-ceiling and roof-ceiling designs are included in the category Luminaires, Luminaire Assemblies and Luminaire Enclosures Classified for Fire Resistance (CDHW). Refer to the individual Classifications in that product category for details on the designs in which the luminaires have been investigated and found acceptable.

15. Restrained and Unrestrained Assemblies

Floor-ceiling and roof-ceiling assemblies include fire-resistance ratings for use in both restrained or unrestrained conditions. It is up to the designer and Authority Having Jurisdiction to determine if an assembly is being used in a restrained or unrestrained application, as required by the building code being enforced. Unrestrained Assembly ratings may be used for floor-ceilings and roof-ceilings designed for either restrained or unrestrained conditions.

The conditions of acceptance in ANSI/UL 263 provide criteria for Restrained Assembly Ratings, Unrestrained Assembly Ratings, Restrained Beam Ratings and Unrestrained Beam Ratings. Because of their more onerous criteria, Unrestrained Assembly Ratings may be used for floors and roofs designed for either restrained or unrestrained conditions.

Classifications resulting from a tested assembly containing a full representation of a floor or roof construction may include: (1) Restrained Assembly Ratings and (2) Unrestrained Assembly Ratings. Results from test of these assemblies are identified as Design Nos. A ____, D ____, G ____, J ____, or P ____. Tested assemblies supported by beams may also include an Unrestrained Beam Rating, but do not include a Restrained Beam Rating. A Restrained Beam Rating is determined only from a test on an assembly with a restrained beam and a partial representation of a floor or roof. Results from tests on this type of assembly are identified as Design Nos. N ____ or S ____.

D900 Series Dual Unrestrained Assembly Ratings

Two unrestrained assembly ratings are indicated for some D900 Series floor-ceiling designs that include unprotected steel floor units. These unrestrained assembly ratings are influenced by the span of the steel floor units. For the longer rating, the maximum span is the span with which the assembly was tested. This rating is determined by the assembly's structural performance during the fire test. The shorter rating is determined by the steel temperatures measured during the test and the span is limited only by the manufacturer's loading tables.

Restraint Conditions

Classifications of floor-ceiling and roof-ceiling assemblies and individual beams include restrained and unrestrained ratings. ANSI/UL 263 and, specifically, Appendix C, provides general information with respect to the concept of these classifications.

Appendix C of ANSI/UL 263 defines restraint in buildings as: "Floor-ceiling and roof-ceiling assemblies and individual beams in buildings should be considered restrained when the surrounding or supporting structure is capable of resisting substantial thermal expansion throughout the range of anticipated elevated temperatures. Constructions not complying with this definition are assumed to be free to rotate and expand and should be therefore considered as unrestrained."

The restrained condition in fire tests is defined in Appendix C of ANSI/UL 263 as: "one in which expansion at the supports of a load carrying element resulting from the effects of the fire is resisted by forces external to the element." This definition may not be appropriate for conditions of restraint in actual structures. The Standard recognizes that the exercise of engineering judgement is required to determine what constitutes "substantial thermal expansion" when determining the conditions under which the restrained or unrestrained ratings should be used.

Restrained conditions for the fire-test assemblies are provided by constructing floor-, beam- and roof-test assemblies within nominal 14 ft by 17 ft frames of composite steel/concrete cross sections having an approximate stiffness (EI/L) of 850,000 kip-in. and 700,000 kip-in. along the 14 ft and 17 ft sides, respectively. The frame stiffness remains constant throughout the fire test because the test frame is insulated from the fire environment.

When applying the published restrained ratings, it is recognized that the individual responsible for the design of the fire-rated construction may ascertain that a different degree of restraint may be provided to the building assembly during a fire condition than was provided to the test sample during the fire test. Under these conditions, the designer may review the Conditions of Acceptance for restrained and unrestrained assemblies and beams in ANSI/UL 263 for additional guidance when determining whether restrained or unrestrained ratings should be specified.

16. Air Ducts and Protection Systems

For designs employing means for the movement of air, ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," or appropriate model mechanism code is to be consulted.

Unless otherwise specified by the design, the ratings were developed based on fire tests employing no air movement. The ratings, therefore, require that air movement be effectively stopped at the start of a fire.

Unless specified otherwise, the minimum distance between the bottom of the duct and the top of ceiling membrane is not to be less than 4 in.; where a greater minimum distance is specified, it may be reduced to 4 in. minimum. For ducts equipped with hinged sheet-steel dampers over duct outlets, unless specified otherwise, the maximum distance between the bottom of the duct and the top of the ceiling is not to exceed 8 in. When Classified ceiling dampers are used, no limit is required for the maximum distance between the bottom of the duct and the top of the ceiling since fire dampers are installed close to the top of ceiling membrane per installation instructions. Where hinged sheet steel dampers are specified, they should be equipped with spring catches and corrosion resistant hinges. Dampers designed to close by gravity should be installed to close in the direction of the air flow. Air diffusers are to be of steel and attached to the duct outlet with steel sheet metal screws. Spacing of screws should be at least three equally spaced for round diffusers and 8 in. OC max per side for square diffusers, with no less than one on each side.

Except where noted in the design, the air diffusers used in the test assemblies were of the surface-mounted type which also supported the surrounding acoustical material by a flange at least 1 in. wide. The opening in the ceiling membrane for attachment of the diffuser to the duct outlet should not be more than 1 in. greater than the size of the duct outlet. Lay-in-type diffusers may be used when they are described in the individual design(s) or in the Classification information of Ceiling Air Diffusers (BZZU) for individual companies.

Classified Ceiling Dampers (CABS) may be used in lieu of the hinged door type dampers in those designs which employ air ducts with the duct outlet protected with a hinged door type damper. The maximum area for individual duct outlets and the total aggregate area of duct outlets per each 100 sq ft of the ceiling area are specified in the design and are applicable when the hinged door type damper is used. If the Classified ceiling damper is also eligible for use in the design, when the maximum size of the duct outlets for the Classified ceiling damper would apply. The size of the duct outlets should be no larger than the maximum size of the Classified ceiling damper.

Some designs specify a smaller aggregate duct outlet area for each 100 sq ft of ceiling area than the maximum size of an individual outlet. In this case, when a Classified ceiling damper is used, the allowable outlet area per 100 sq ft of ceiling area should be established on the basis of 1/2 the area of the individual maximum size.

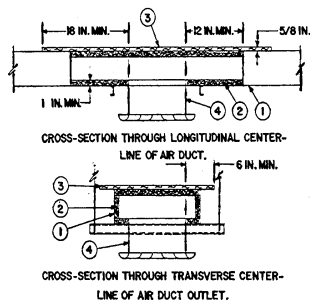
When a design requires the use of a covering material around the duct outlet and/or the hinged door damper, ceramic paper or a material having equivalent thermal properties of the ceramic paper should be used.

Duct outlets should be located in the field of an acoustical panel; however, where it is necessary to cut a main runner or cross tee, each cut end should be supported by a vertical No. 12 SWG hanger wire. A 1/2 in. clearance should be maintained between the duct outlet and each cut end of main runner or cross tee. The duct outlet should be located so that no more than one main runner or cross tee is cut when penetrating the ceiling membrane.

Flexible air ducts may be used with Classified Air Terminal units designated for use in designs. The flexible air duct should be 6 to 8 in. diameter, Class 0 or Class 1 Air Connector or Air Duct, bearing the UL Listing Mark. For assemblies with wood joists ("L" series designs), use Air ducts only. The flexible duct should be supported 4 to 6 ft OC with steel straps and/or No. 12 SWG steel hanger wire so that no portion of the flexible duct is within 4 in. of the top of the ceiling membrane, except where connected to the Air Terminal Unit.

The following duct outlet protection may be used as alternate systems. System A may only be used when it is specified in the individual design. System B may be used in any design which contains a steel duct with the duct outlet protected by a hinged door damper, for equal or smaller outlet size. The systems have been investigated for their effectiveness in retarding the transfer of heat into the ceiling space but their ability to retard smoke and other combustion products have not been investigated.

Duct Outlet Protection System A

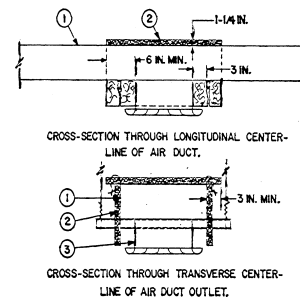


Duct Outlet Protection System A

- Steel Air Duct** — Construction and support provisions are specified by the individual fire-resistance design. Duct outlet to be provided with a louvered, surface mounted, steel air diffuser, secured with steel fasteners. Duct supported by 1-1/2 in., min 0.053 in. thick (No. 16 gauge) cold-rolled steel channels hung at each end from structural members of floor or roof with No. 12 SWG galv steel wire. When duct outlets are 144 sq in. or smaller, cold-rolled channels should be located adjacent to one or both sides of the duct outlet and spaced a max of 48 in. OC. When duct outlets are larger than 144 sq in., cold-rolled channels should be located adjacent to each side of the duct outlet and spaced a max of 48 in. OC.
- Glass Fiber Duct Lining** — Min 1 in. thick, 3.0 to 5.0 pcf density, unfaced or faced with paper, foil, plastic film or asphalt emulsion. Lining affixed to inside of duct with adhesive or steel fasteners or both. Lining and adhesive should have a flame spread rating of 25 or less and a smoke developed index of 50 or less, as determined by the ANSI/UL 723 and should comply with all other specifications in ANSI/NFPA 90A. Lining should cover the full inside perimeter of the duct, extending at least 12 in. beyond the edges of the duct outlet. Lining on bottom of duct to be cut flush with the edges of the duct outlet.
- Acoustical Lay-in Panel** — Any nom 5/8 in. acoustical lay-in panel Classified by UL for use in fire-resistance designs. Panels should be laid on top of duct, extending at least 6 in. beyond sides of duct outlet along width of duct, and extending at least 18 in. beyond sides of duct outlet along length of duct. More than one panel may be butted together to form a panel of the required dimensions. Panels should have a flame spread index of 25 or less and a smoke developed index of 50 or less as determined by ANSI/UL 723 and should comply with all other specifications in ANSI/NFPA 90A.
- Ceramic Paper** — Where specified by the individual fire-resistance

design, ceramic paper should be affixed to the duct outlet.

Duct Outlet Protection System B



Duct Outlet Protection System B

- Steel Air Duct** — Construction and support provisions as specified in the individual designs. Outlet to be provided with a louvered, surface mounted, steel diffuser, fastened securely with steel fasteners. Duct supported by 1-1/2 in., min 0.053 in. thick (No. 16 gauge) cold-rolled steel channel hung at each end from structural members of floor or roof with No. 12 SWG galv steel wire. When duct outlets are 144 sq in. or smaller, cold-rolled channels should be located adjacent to one or both sides of the duct outlet and spaced a max of 48 in. OC. When duct outlets are larger than 144 sq in., cold-rolled channels should be located adjacent to each side of the duct outlet and spaced a max of 48 in. OC.
- Mineral Wool Batts** — 1-1/4 in. thick mineral wool batts, 3.5 to 8.0 pcf density. Top piece of batt should extend at least 3 in. beyond the sides of the duct and 6 in. beyond the edges of the duct outlet. Side pieces should extend from the lower face of the top piece to the upper face of the ceiling membrane along the entire length of the top piece. Side pieces tied to top piece with No. 18 SWG galv steel wire, 18 in. OC. Material should have a flame spread index of 25 or less, a smoke developed index of 50 or less as determined by ANSI/UL 723, and should comply with all other specifications in ANSI/NFPA 90A.
- Ceramic Paper** — Where specified in the design, ceramic paper should be affixed to the duct outlet.

17. Blanket Insulation

Unless specifically described in a design, the addition of insulation in the concealed space between the ceiling membrane and the floor or roof structure may reduce the hourly rating of an assembly by causing premature disruption of the ceiling membrane and/or higher temperatures on structural components under fire exposure conditions.

Insulation in G500, L500, M500 and P500 Series Designs — For 1-hour rated G500, L500, M500 and P500 series assemblies, fiberglass insulation, either loose-fill, batts or blankets may be added to the plenum or joist space above the gypsum wallboard provided an additional layer of gypsum wallboard is added to the assembly. The gypsum wallboard should be of the same type as shown in the individual designs. The base layer of wallboard should be attached with the fastener type and spacing as described in the design. It is not necessary to tape the joints of the base layer. The finish layer of gypsum wallboard should also be attached with the fastener type and spacing as described in the individual design. The length of the fasteners should be increased by a minimum of the wallboard thickness of the additional layer. The joints in the finish layer should be finished as described in the design.

Other methods of adding insulation in the plenum or joist cavity are not permitted unless indicated in the individual designs.

18. Wood Frame Construction

Spaces between joists or trusses and spaces between the ceiling and the floor above should be provided with firestopping or draft stopping as specified in the provisions of applicable building codes.

When a non-fire-rated wood stud wall assembly abutts the bottom of a wood joist floor-ceiling assembly employing a membrane ceiling, the membrane should be continuous above the top plate of the wall assembly.

19. Roof Coverings

Most roof assemblies are tested with Class C roof covering. The fire-resistance ratings for these assemblies are also applicable when the roof covering is a Class A, B or C system consisting of hot mopped or cold-applied bituminous materials. The Class A, B and C ratings are determined by ANSI/UL 790, "Standard Test Methods for Fire Tests of Roof Coverings."

Class A, B or C roof coverings consisting of hot mopped or cold applied bituminous materials or a roof covering material Classified under Roofing Membranes (CHC) may be applied directly to the concrete or wood surface of floor designs being used as roofs without a reduction of fire-resistance ratings.

Class A, B or C prepared roof covering may be used on wood floor designs without a reduction of the fire-resistance rating provided a nailer of equal thickness to the length of the mechanical fasteners is added to the flooring.

20. Roof Insulation

Roof insulation is to be carefully controlled relative to manufacturer, type and thickness as specified. Less than the specified thickness could result in higher temperatures on the roof covering while a greater thickness of insulation could cause earlier structural failure.

Classified polystyrene insulation, with a density of 5 pcf or less, may be placed on concrete floors or structural concrete roofs without reducing the assembly rating.

When mineral and fiber boards, polystyrene insulation exceeding 5 pcf or polyisocyanurate insulation are used over the concrete in D 900 Series designs, the unrestrained beam rating should be increased by a minimum of 1/2 hr.

21. Uplift Resistance

The resistance of the roof assemblies to uplift by pressures on the roof surface or other damage which may result from high-velocity wind has not been investigated. Roof deck constructions Classified for uplift resistance are illustrated in the Roofing Materials and Systems Directory.

22. Steel Roof Deck Fasteners

Steel Roof Deck Fasteners that have been investigated as part of a Roof Deck Construction may be used to fasten the roof deck to steel joists or beams in lieu of welding or screws, in fire-resistive assemblies. See Roof Deck Fasteners (TLSX) for a list of manufacturers. See Roof Deck Constructions (TGKX) for a list of roof constructions that have been investigated for uplift resistance. The steel fasteners must be compatible with the construction shown in the individual fire-resistive designs.

Screw tips penetrating the steel roof deck in all P700 and P800 series designs require spray-applied fire-resistive material. The spray-applied fire-resistive material specified in the design should be applied to cover the tips at a minimum thickness of 1/2 in.

23. Steel Floor Unit Fasteners

The connection of the steel floor or roof units to the supporting steel structure is specified in the individual design. For A___, D___ and G___ series designs requiring puddle welds of the steel floor units to the supporting steel structure, power-driven fasteners may be used as an alternate to the puddle welds, provided equivalent strength capacity is maintained in the connection.

Minimum 3/4-in. long #10 self-drilling screws may be used as an alternate to button-punching the side laps of adjacent steel floor and form units in A___, D___, G___ and P___ series designs. The spacing of the screws should be the same as indicated for the button punches.

IV. BEAMS

This section on beams applies to W, M or S shaped hot rolled structural steel sections as defined by the American Institute of Steel Construction.

The conditions of acceptance in ANSI/UL 263 provide criteria for Restrained Beam Ratings and Unrestrained Beam Ratings. A greater thickness of protection material is typically required for the Unrestrained Beam Rating as compared to the protection material thickness required for the Restrained Beam Rating based on the differences in the rating criteria. Accordingly, Unrestrained Beam Ratings may be used for beams designed for either restrained or unrestrained conditions. Restrained Beam Ratings may be used for beams designed for restrained conditions.

ANSI/UL 263 provides for beams to be included in two types of test assemblies. One type of test assembly contains a full representation of the floor or roof construction being supported by the beam. Classifications resulting from this type of tested assembly may include: (1) Restrained Assembly Ratings, (2) Unrestrained Assembly Ratings, and (3) Unrestrained Beam Ratings. Restrained Beam Ratings are not determined from this type of test assembly. Results from these tests are identified as Design Series Nos. A00, D00, G00, J00 or P00. The other type of test assembly contains a partial representation of the floor or roof construction. Classifications resulting from this type of tested assembly may include: (1) Restrained Beam Ratings and (2) Unrestrained beam Ratings. Ratings for floor or roof assemblies are not determined from this type of test assembly. Results from these tests are identified as Design Series Nos. N00 or S00.

1. Beam Size

For fire-resistance purposes, the minimum beam size is expressed in terms of a W/D ratio, where W is the weight of the beam per lineal foot and D is the perimeter of protection material at the interface between the steel section and the protection material. Accordingly, beams of the same configuration and having a greater W/D ratio than the beam size specified in the fire-resistive design are considered larger than the specified minimum size beam and may be used in that design.

W/D values are published by the American Institute of Steel Construction, Inc. In 2001, the method used to calculate the perimeter was refined to include the fillets of hot-rolled sections rather than assuming right angle intersections. An example of this change results in the W/D value for a W8x28 section changing from 0.80 to 0.819.

Application of equations in the Fire Resistance Directory that include proportional relationship of the (W/D) value are not affected by the change in the calculation process for (W/D), provided the (W/D) values used are determined by a single method.

2. Composite and Noncomposite Beams

The load applied on beams during the fire tests has been determined by the allowable stress design method specified by the American Institute of Steel Construction. Noncomposite beams may be substituted when composite beams are specified in a design because composite beams deflect more under fire conditions when loaded to their design load than noncomposite beams. Composite beams may only be substituted into designs which specify composite beams.

3. Cavities

Cavities, if any, between the upper beam flange and the steel floor or roof units should be filled with the fire-resistive coating material applied to the beam, unless specified otherwise on the individual design.

4. Beam Substitution

Beam ratings depend upon the type of floor or roof the beam is supporting and the protection on the floor or roof units, as well as the type and thickness of protection material applied to the beam. The substitution of beams into a floor assembly (A--, D--, G-- or J-- Design) or roof assembly (P-- Design) should be limited to assemblies which have a similar or greater capacity for heat dissipation from the beam as compared to the capacity for heat dissipation of the floor or roof construction specified in the design from which the beam is being transferred.

For concrete floors, an equal or greater capacity for heat dissipation exists when the concrete has an equal or greater density range and volume per unit floor area.

Spray-applied Fire-resistive Materials

Application of N Series Designs

When it is the intent to only maintain the existing Assembly Rating, the beams, steel joists and steel trusses from N Series Designs may be substituted for the tested structural member provided the hourly Unrestrained Beam Rating of the structural member being transferred is at least equal to the Unrestrained Beam Rating of the structural member being replaced. Additionally, for steel joists and steel trusses the Restrained Beam Rating of the joist or truss being transferred is to be equal to or greater than the Restrained Assembly Rating of the floor-ceiling assembly into which the joist or truss is being transferred.

When it is the intent to comply with requirements that the structural member's hourly rating be equal to or greater than the assembly's hourly rating, the structural member from the N Series Design may be substituted for the tested structural member provided also that the hourly Beam Rating of the structural member being transferred is at least equal to the hourly rating of the requirement. Additionally, the Restrained Beam Rating of the structural member being transferred is to be equal to or greater than the Restrained Assembly Rating of the floor assembly into which the structural member is being transferred.

For applications where the assembly's hourly rating differs from the structural member rating, particular attention should be made to the thickness of fire protection materials applied to the underside of the floor adjacent to the structural member. The thickness of fire protection material required within 12 in. beyond the edges of the structural member should be the lesser of the beam protection thickness or the deck protection thickness as required by the N Series Design but not less than the thickness of fire protection material required by the assembly.

Application of S Series Designs

When it is the intent to only maintain the existing Assembly Rating, the beams, steel joists and steel trusses from the S Series Designs may be substituted for the tested structural member provided the hourly Unrestrained Beam Rating of the structural member being transferred is at least equal to the Unrestrained Beam Rating of the structural member being replaced. Additionally, the Restrained Beam Rating of the structural member being transferred is to be equal to or greater than the Restrained Assembly Rating of the roof assembly into which the structural member is being transferred.

When it is the intent to comply with requirements that the structural member's hourly rating be equal to or greater than the assembly's hourly rating, the structural member from the S Series Design may be substituted for the tested beam provided also that the hourly Beam Rating of the structural member being transferred is at least equal to the hourly rating of the requirement. Additionally, the Restrained Beam Rating of the structural member being transferred is to be equal to or greater than the Restrained Assembly Rating of the roof assembly into which the structural member is being transferred.

For applications where the assembly's hourly rating differs from the structural member rating, particular attention should be made to the thickness of fire protection material applied to the underside of the roof deck adjacent to the structural member. The thickness of fire protection material required within 12 in. beyond the edges of the structural member should be the lesser of the beam protection thickness or the deck protection thickness as required by the S Series Design but not less than the thickness of fire protection material required by the assembly.

Application of A, D, G, J and P Series Designs

When it is the intent to only maintain the existing Assembly Rating, the beams from A, D, G, J and P Series Designs may be substituted for the tested beam provided that: (1) the Unrestrained Beam Rating of the beam being transferred is equal to or greater than the Unrestrained Beam Rating of the beam being replaced; and (2) the Restrained Assembly Rating of the

assembly from which the beam is being transferred is equal to or greater than the Restrained Assembly Rating of the assembly into which the beam is being transferred.

When it is the intent to comply with requirements that the beam's hourly rating be equal to or greater than the assembly's hourly rating, the beams from A, D, G, J and P Series Designs may be substituted for the tested beam provided also that the hourly Unrestrained Rating of the beam being transferred is at least equal to the hourly rating of the requirement.

Mastic and Intumescent Coatings Application of N Series and S Series Designs

The beams, steel joists and steel trusses from N Series Designs may be substituted for the tested structural member, provided the hourly Unrestrained Beam Rating of the structural member being transferred is at least equal to the Unrestrained Beam Rating of the structural member being replaced, and the Restrained Beam Rating of the structural member being transferred is equal to or greater than the Restrained Assembly Rating of the floor-ceiling assembly into which the structural member is being transferred.

5. Unprotected Floors and Roofs

The Unrestrained Beam Ratings in the N400, N600, N700 and N800 Series designs with spray-applied fire protection material on the steel floor decks may be used with unprotected steel floor deck assembly designs (D900 Series) or unprotected precast concrete floors provided that the beam fire protection material is oversprayed to the underside of the floor on both sides of the beam for a minimum width of 12 in. beyond the edges of the beam flange. The thickness of the protection material oversprayed to the underside of the floor should be the same as required for the beam. Overspraying is not required when the N Series designs with unprotected steel floor decks are substituted in the D900 Series designs or to support unprotected precast concrete units.

The Unrestrained Beam Ratings in the S400, S600, S700 and S800 Series designs with spray-applied protection material on the steel roof decks may be used with unprotected steel roof deck assembly designs (P9-- designs) provided the beam protection material is oversprayed to the underside of the roof on both sides of the beam for a minimum distance of 12 in. beyond the edges of the beam flange. The thickness of protection material oversprayed to the underside of the roof should be the same as required for the beam. Overspraying is not required when the S-- designs with unprotected steel roof decks are substituted in the P9-- roof designs.

6. Adjustment of Thickness of Spray-applied Fire-resistive Materials for Restrained and Unrestrained Beams

Alternate-sized steel beams may be substituted for the given beam in the A700, A800, A900, D700, D800, D900, G700, G800, J700, J800, J900, N700, N800, P700, P800, P900, S700 and S800 series designs, provided the beams are of the same shape, and the thickness of spray-applied fire-resistive material for 1, 1-1/2, 2, 3 and 4 h Restrained and Unrestrained Beam ratings is adjusted in accordance with the following equation:

$$T_1 = \frac{\left(\frac{W_2}{D_2} + 0.6\right)(T_2)}{\left(\frac{W_1}{D_1} + 0.6\right)}$$

Where:

T = Thickness (in.) of spray-applied material

W = Weight of beam (lb/ft)

D = Perimeter of protection, at the interface of the protection material and the steel through which heat is transferred to steel (in.)

Subscript 1 = Refers to alternate beam size and required material thickness

Subscript 2 = Refers to given beam size and material thickness shown on the individual design

1) W/D values are not less than 0.37

2) T_1 values are not less than 3/8 in. and

3) the Unrestrained and Restrained Beam Rating is not less than 1 h.

The use of this procedure is applicable to the adjustment of spray-applied fire-resistive material thickness on restrained and unrestrained beams having solid web members. It is not applicable to the adjustment of mastic and intumescent coatings on restrained and unrestrained beams.

When used to adjust the material thickness for a restrained beam, the use of this procedure is limited to steel sections classified as compact in accordance with the Specification for the Design of Structural Steel Buildings by the American Institute of Steel Construction, Load and Resistance Factor Design (Third Ed.).

7. Restrained and Unrestrained Conditions

Classifications of floor-ceiling and roof-ceiling assemblies and individual beams include restrained and unrestrained ratings. See **Section III FLOOR-CEILINGS AND ROOF-CEILINGS, Item 16 Restrained and Unrestrained Assemblies** for additional information on this subject.

V. COLUMNS

The minimum column size and configuration of the steel member is specified in the X and Y Series designs. The same hourly rating applies

when a steel section with an equal or greater W/D ratio is substituted for the specified column size of the same configuration.

W/D values are published by the American Institute of Steel Construction, Inc. for contour and box protection configurations. In 2001, the method used to calculate the contour perimeter was refined to include the rounded fillets of hot-rolled sections rather than assuming right angle web-flange intersections. An example of this change results in the W/D value for a W10x49 section (with four side contour protection) changing from 0.83 to 0.84.

Application of equations in the Fire Resistance Directory that include a proportional relationship of the (W/D) value is not affected by the change in the calculation process for (W/D), provided the (W/D) values used in each application are determined consistently by a single method.

The thickness of the coating materials in the X700, X800 and Y700 Series designs required on wide flange steel sections smaller than specified in a design may be calculated as follows:

$$X_2 = 1.25(X_1) \left(\frac{W_1}{D_1} \right) \left(\frac{D_2}{W_2} \right)$$

Where:

x2 = Thickness of coating for smaller wide flange section

x1 = Thickness of coating used on the rated steel section

W2 = Weight per foot of smaller wide flange section

W1 = Weight per foot of the rated steel section

D2 = Perimeter of smaller steel section at interface with coating

D1 = Perimeter of the rated steel section at interface with coating

Guidance addressing the application of spray-applied fire-resistive materials to primed or similarly painted wide flange steel shapes is provided in the section titled **Coating Materials**.

The fire-resistive materials applied to the steel sections should be protected from damage.

VI. WALLS AND PARTITIONS

The ratings for walls and partitions apply when either face of the assembly is exposed to the fire unless indicated otherwise on a specific design. Flashing and corner details may vary from those described in a design provided structural equivalency is maintained and similar materials to those specified in the design are used for supports, fasteners and flashings. Where dynamic movement is specified in Joint Systems (XHBN) that utilizes either U400-, V400- or W400-Series fire-resistance-rated wall and partition assemblies, the special features of the walls to accommodate dynamic movement are intended to be as specified in the individual designs under XHBN.

The hourly rating of a load-bearing assembly also applies to the same assembly when it is used as a non-load-bearing assembly.

The size of studs is minimum unless otherwise stated in a design.

The spacing of studs is a maximum unless otherwise stated in a design.

Spacing between parallel rows of studs are minimums unless otherwise stated in the individual designs.

Gypsum board thicknesses specified in specific designs are minimums. Greater thicknesses of gypsum board are permitted as long as the fastener length is increased to provide penetration into framing that is equal to or greater than that achieved with the specified gypsum board thickness and fasteners.

Additional layers of gypsum board are permitted to be added to any design.

Orientation, vertical or horizontal, of the application of gypsum board in walls and partitions is specified in the individual designs.

Except when gypsum board is allowed to be applied horizontally in the individual wall designs, horizontal butt joints of vertically applied gypsum board should be backed by the same type studs as specified in the design. Alternatively, minimum 25 gauge steel framing with a minimum attachment face of 1-1/4 in. may be used for the backing. Both edges of the gypsum board forming the horizontal joint should be attached to the backing with the same screws and spacing as specified in the design for the attachment of the gypsum board edges, then finished as specified for the vertical joints.

Horizontal butt joints on opposite sides of the studs in single-layer applications should be staggered a minimum of 12 in. unless otherwise stated in the individual designs. Horizontal butt joints in adjacent layers on the same face of the assembly in multiple-layer applications should be staggered a minimum of 12 in. unless otherwise stated in the individual designs.

1. Wood Stud Walls

The firestopping requirements for wood stud assemblies should be determined from the Authority Having Jurisdiction. Horizontal bridging is included in most fire-test samples in order to fully load the wood studs. This horizontal bridging should not be considered as a means of firestopping.

The hourly fire ratings for load-bearing wood stud walls tested before January 1, 2009, were derived with a superimposed load applied to the wall assembly intended to theoretically develop maximum working stresses not exceeding the design values published in the Supplement to the 1991 Edition of the National Design Specification for wood construc-

tion. In addition, the design load per square inch of cross-sectional area for any wood stud should not exceed 385 psi. For fire-resistive designs based upon data generated after December 31, 2008, the superimposed load applied to the wall assembly was derived from ASTM D6513, "Standard Practice for Calculating the Superimposed Load on Wood-frame Walls for Standard Fire-Resistance Tests," and includes a reference to the edition of the National Design Specification used to calculate the design load, the design method, the limiting design factor, and the percentage of the design load applied to the test sample.

Wood stud walls may contain fire-retardant-treated studs as well as untreated wood studs. The use of fire-retardant-treated plywood (wood structural panels) may be used in designs that contain use of untreated plywood when all other specified attributes are equivalent to the wood structural panel in the design.

2. Steel Studs

The dimensions and gauge of steel studs are minimums. The hourly ratings apply when the steel studs are of a heavier gauge and/or larger dimensions than specified in a design. The superimposed load of bearings walls utilizing steel studs should be based on the capacity of the studs as determined by the "North American Specification and Commentary for the Design of Cold-Formed Steel Structural Members" (2007).

Where lateral support of studs (by means of straps, channels or similar steel members) is required in the design, the loads applied to steel studs should be based on the steel-braced design. The loads based on sheathing bracing should not be assumed, unless otherwise stated in the design.

The loads applied to steel studs having a yield stress higher than the stated minimum should be based upon the specified minimum yield stress stated in the design.

Non-load-bearing steel studs are produced in accordance with ASTM C645, "Standard Specification for Nonstructural Steel Framing Members." In accordance with ASTM C645, the minimum flange width should be 1-1/4 in. and the minimum return lip should be 3/16 in. Studs are also produced with steel having a minimum yield strength of 33 ksi.

3. Metal Thickness

Unless otherwise indicated in the individual designs, the following minimum metal thickness tables apply where a metal gauge designation is stated. Metal gauges are no longer referenced in ASTM Standards. It is still an industry practice to specify steel components by gauge. Because many of the designs contained herein refer to metal gauge the following information is to be used as a guide where field questions occur. The tables shown herein should be used as a reference and the Authority Having Jurisdiction should be consulted if discrepancies exist between these tables and a local code requirement. Due to structural considerations and fire performance considerations the minimum thickness tables are different for steel deck (floor or roof), load-bearing studs and non-load-bearing studs.

The minimum thickness for load-bearing steel studs is based upon ASTM C955-96, "Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks) and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases." The color code denoted by the ASTM Standard is also shown below. For load-bearing steel studs, the minimum bare metal thickness should be as follows:

Gauge	Color Code	Min Thkns Bare Metal In.
20	White	0.0329
18	Yellow	0.0428
16	Green	0.0538
14	Orange	0.0677

For non-load-bearing studs, the minimum thickness is based upon ASTM C645. The color code denoted by the ASTM Standard is also shown below. For non-load-bearing steel studs, the minimum bare metal thickness should be as follows.

Gauge	Color Code	Min Thkns Bare Metal, In.
25	None	0.0179
22	Black	0.0269
20	White	0.0329
18	None	0.0428
16	None	0.0538

4. Gypsum Board Joint Treatment

The joints in gypsum board applied to wood or steel studs may either be exposed or covered with joint tape and joint compound for that portion of the joint above a suspended ceiling which is part of a fire-resistive floor-ceiling or roof-ceiling assembly.

5. Nonmetallic Electrical Outlet Boxes

Outlet Boxes and Fittings Classified for Fire Resistance (CEYY) includes Classifications for nonmetallic outlet and switch boxes for use in wall or partition assemblies. The information provided for each Classification includes the model numbers for the Classified products, a description of the rated assemblies, the spacing limitations for the boxes and the installation

details. Nonmetallic boxes should not be installed on opposite sides of walls or partitions of staggered stud construction unless Classified for use in such constructions.

6. Metallic Electrical Outlet Boxes

Listed single and double gang metallic outlet and switch boxes with metallic or nonmetallic cover plates may be used in bearing and nonbearing wood stud and steel stud walls with ratings not exceeding 2 h. These walls should have gypsum wallboard facings similar to those shown in Design Nos. U301, U411 and U425. The metallic outlet or switch boxes should be securely fastened to the studs and the opening in the wallboard facing should be cut so that the clearance between the box and the wallboard does not exceed 1/8 in. The surface area of individual metallic outlet or switch boxes should not exceed 16 sq in. The aggregate surface area of the boxes should not exceed 100 sq in. per 100 sq ft of wall surface. The aggregate surface area of the boxes may be exceeded when Wall-opening Protective Materials (CLIV) are installed according to the requirements of their Classification.

Metallic boxes located on opposite sides of walls or partitions should be separated by a minimum horizontal distance of 24 in. This minimum separation distance between metallic boxes may be reduced when Wall-opening Protective Materials (CLIV) are installed according to the requirements of their Classification.

Metallic boxes should not be installed on opposite side of walls or partitions of staggered stud construction unless Wall Opening Protective Materials are installed with the metallic boxes in accordance with Classification requirements for the protective materials.

7. Exterior Walls

The fire-resistive designs and UL Classified materials for walls and partitions are investigated to ANSI/UL 263, which addresses fire-resistive requirements only with the understanding that their use is intended for interior applications. Where an exterior application of a UL Classified wall or partition design is desired, the local building code and Authority Having Jurisdiction should be consulted to ensure compliance with other code requirements applicable to exterior walls.

8. Concrete Masonry Units

Unless otherwise indicated in the individual designs, the allowable compressive stress for the concrete masonry units have been determined from the empirical design method for masonry found in the model codes. For assemblies that have been tested at less than 100% of the allowable compressive stress, the design states the maximum allowable compressive stress for the assembly.

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CEILING DAMPERS (CABS)

USE AND INSTALLATION

This category covers ceiling dampers investigated for use in fire-resistance designs as detailed in Fire-resistance Ratings - ANSI/UL 263 (BXUV).

Ceiling dampers are designed to function as a heat barrier in air-handling openings penetrating the ceiling membrane of fire-resistive floor-ceiling designs and/or roof-ceiling designs for which they have been investigated.

The certification covers ceiling damper models for (1) use in lieu of hinged-door-type dampers in floor-ceiling or roof-ceiling designs that contain air ducts and specify the use of a hinged-door-type damper over each duct outlet, or (2) use in specific floor-ceiling and/or roof-ceiling designs as marked on the damper. An air duct with a hinged-door-type damper must be a specified component of the floor-ceiling and/or roof-ceiling design for a ceiling damper to be an acceptable option unless the ceiling damper is certified for use in the design.

Ceiling dampers are intended to be installed in accordance with the provided installation instructions. For ceiling dampers intended for installation in a duct outlet in lieu of hinged-door-type dampers, the location of the ceiling damper in the duct outlet relative to the ceiling level is specified in the installation instructions. This location must be followed during installation in order to obtain the hourly fire-rated performance of the design.

The individual certifications information indicate whether (1) each damper type can be used in all designs conforming to the specifications under the certification, or (2) only for specific design(s) that show the certified company name and damper type. In the latter case, the individual design numbers are shown in the Certification Mark.

PRODUCT MARKINGS

A separate label located adjacent to the Certification Mark identifies whether the ceiling damper has been investigated for use in static or dynamic systems. The label for ceiling dampers for use in dynamic systems also includes the maximum air flow and closure pressure for which the

CEILING DAMPERS (CABS)

damper has been investigated. A ceiling damper labeled for use in dynamic systems is also suitable for use in static systems.

RELATED PRODUCTS

For information on related products, see Fire-resistance Ratings – ANSI/UL 263 (BXUV).

ADDITIONAL INFORMATION

For additional information, see Fire-resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate the physical performance of ceiling dampers in this category is ANSI/UL 555C, "Ceiling Dampers."

The basic standard used to investigate the fire-resistance performance of ceiling dampers in this category for use in floor-ceiling and/or roof-ceiling designs in lieu of the hinged-door-type dampers shown in those designs is ANSI/UL 555C.

The basic standard used to investigate the fire-resistance performance of ceiling dampers in this category for use in floor-ceiling and/or roof-ceiling designs that do not indicate the use of hinged-door-type dampers in the design is ANSI/UL 263, "Fire Tests of Building Construction and Materials."

Fire performance measured by ANSI/UL 263 is based upon the assumption that air movement will be effectively stopped at the start of a fire. Ceiling dampers intended for use in HVAC systems where the airflow is operational at the time of a fire, such as in a smoke-control system, or from other situations in which the fan system is operational at the time of a fire, are investigated for dynamic closure. Ceiling dampers intended for use where the air movement is effectively stopped at the start of a fire are not required to be investigated for dynamic closure.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**CEILING DAMPER
FIRE RESISTANCE CLASSIFICATION
DESIGN NO(S). ____
SEE UL FIRE RESISTANCE DIRECTORY
No.**

**CEILING DAMPER
FIRE RESISTANCE CLASSIFICATION
SEE UL FIRE RESISTANCE DIRECTORY
No.**

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LUMINAIRES, LUMINAIRE ASSEMBLIES AND LUMINAIRE ENCLOSURES CLASSIFIED FOR FIRE RESISTANCE (CDHW)

USE

This category covers luminaires, luminaire assemblies and luminaire enclosures investigated for use in fire-resistance designs as detailed in Fire-resistance Ratings – ANSI/UL 263 (BXUV). The luminaires, assemblies and enclosures (in conjunction with a luminaire) are intended for recessed installation in ceilings in accordance with ANSI/NFPA 70, "National Electrical Code." They have been shown to provide a degree of fire resistance with the floor or roof assemblies with which they have been tested.

The luminaires and luminaire assemblies have been investigated and found to comply with applicable electrical requirements and are so labeled.

RELATED PRODUCTS

For information on related products, see Fire-resistance Ratings – ANSI/UL 263 (BXUV).

ADDITIONAL INFORMATION

For additional information, see Fire-resistance Ratings (BXRH).

REQUIREMENTS

The basic standards used to investigate luminaires and luminaire assemblies in this category are ANSI/UL 263, "Fire Tests of Building Construction and Materials," and ANSI/UL 1598, "Luminaires."

The basic standard used to investigate luminaire enclosures in this category is ANSI/UL 263.

UL MARK

LUMINAIRES, LUMINAIRE ASSEMBLIES AND LUMINAIRE ENCLOSURES CLASSIFIED FOR FIRE RESISTANCE (CDHW)

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**[PRODUCT IDENTITY*] CLASSIFIED FOR FIRE RESISTANCE
FIRE RESISTANCE CLASSIFICATION
DESIGN NO(S). ____
SEE UL FIRE RESISTANCE DIRECTORY
Issue No.
or**

**[PRODUCT IDENTITY*] CLASSIFIED FOR FIRE RESISTANCE
FIRE RESISTANCE CLASSIFICATION
SEE UL FIRE RESISTANCE DIRECTORY
Issue No.**

*** LUMINAIRE, LUMINAIRE ASSEMBLY or LUMINAIRE ENCLOSURE**

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OUTLET BOXES AND FITTINGS CLASSIFIED FOR FIRE RESISTANCE (CEYY)

GENERAL

This category covers outlet boxes and fittings investigated for use in fire-resistance designs as detailed in Fire Resistance Ratings – ANSI/UL 263 (BXUV). These are special-purpose boxes intended for installation in floors, and nonmetallic outlet boxes intended for installation in floors, walls and partitions, and/or ceilings. They are intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). They have shown a degree of fire resistance when installed in the particular floor(s), wall(s) and/or ceiling(s) described for each Classified company.

This category includes Classifications for nonmetallic outlet and switch boxes for use in fire-resistance-rated wall or partition assemblies. The information provided for each Classification includes the model numbers for the Classified products, a description of the rated assemblies, the spacing limitations for the boxes and the installation details. Nonmetallic boxes should not be installed on opposite sides of walls or partitions of staggered stud construction unless Classified for use in such constructions.

Nonmetallic outlet boxes described for installation in fire-resistance assemblies consisting of wood joists and gypsum-board ceilings are also suitable for use in assemblies consisting of pre-engineered wood joists or trusses and gypsum-board ceilings.

Authorities Having Jurisdiction should be consulted before installation.

FLOOR BOXES

Boxes intended for use with floors have been investigated for use with electrical receptacles fabricated of melamine, phenolic or urea materials, unless specified otherwise in the installation instructions and Classification information. Floor boxes and fittings are intended to be installed in accordance with installation instructions provided with the product.

Boxes with integral connectors for electric metallic tubing or for unthreaded rigid metallic conduit are provided with a marking on the carton to indicate the specific type or types of wiring system for which the box has been tested.

Floor boxes designated for floor installation as covered in the NEC are provided with covers and gaskets to exclude surface water and sweeping compounds that might be present in floor-cleaning operations. Those boxes intended for installation in concrete floors are frequently provided with leveling screws, threaded hubs, or both, and are provided with a marking on the carton to identify boxes of this type, such as "Floor Box" or "Floor Box, Concrete Tight," as appropriate.

WALL AND PARTITION AND CEILING BOXES

Nonmetallic outlet boxes investigated for installation in fire-resistive assemblies are provided with the appropriate Listing Mark for electrical products and other markings as described in Nonmetallic Outlet Boxes

OUTLET BOXES AND FITTINGS CLASSIFIED FOR FIRE RESISTANCE (CEYY)

(QCMZ). Nonmetallic outlet boxes Classified for use in fire-resistive designs may have the following marking in the base of the box:



Class * hr, F, W and/or C

where * indicates the hourly rating, such as 1 hr or 2 hr and F = Floor, W = Wall and C = Ceiling.

The boxes are Classified for use in certain fire-resistive designs when installed in accordance with the details described for each Classified company. Any Listed metallic or nonmetallic cover is suitable for use with these nonmetallic boxes.

For installation of Listed metallic outlet and switch boxes, see information in the General Design Information Section of UL's Fire Resistance Directory, Walls and Partitions – Penetrations.

RELATED PRODUCTS

For information on related products, see Fire Resistance Ratings – ANSI/UL 263 (BXUV).

Outlet boxes that comply with established electrical requirements are Listed under Metallic Outlet Boxes (QCIT) and Nonmetallic Outlet Boxes (QCMZ).

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 263, "Fire Tests of Building Construction and Materials," and Supplement SB ("Nonmetallic Boxes for Installation in Fire Resistance Rated Wall and Partition Assemblies") of ANSI/UL 514C, "Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers."

Where indicated in the individual Classifications, products have also been investigated for heat and smoke release characteristics in accordance with UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces." Such products may be installed in air-handling spaces in accordance with Sec. 300.22(C) of the NEC.

UL MARK

The Classification Mark of UL on the product or on each UL Classified steel floor and form unit with factory-installed floor boxes, or the UL symbol on the product and the Classification Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**OUTLET BOXES AND FITTINGS
FIRE RESISTANCE CLASSIFICATION
SEE UL FIRE RESISTANCE DIRECTORY**

Control No.

Where indicated in the individual Classifications, the Classification Mark may also include the statement:

**SUITABLE FOR USE IN AIR-HANDLING SPACES
IN ACCORDANCE WITH SEC. 300.22(C) OF
THE NATIONAL ELECTRICAL CODE**

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SPEAKER ASSEMBLIES FOR FIRE RESISTANCE (CHML)

USE AND INSTALLATION

This category covers speaker assemblies investigated for use in ceilings of fire-resistive floor-ceiling and roof-ceiling assemblies as detailed in Fire-resistance Ratings – ANSI/UL 263 (BXUV). The assemblies have been shown to provide a degree of fire resistance when installed in the specific designs described for each certified company.

The speaker assemblies have been investigated for use in specific ceilings with respect to: (1) maximum size of the individual speaker assemblies, (2) minimum spacing between individual speakers and (3) maximum aggregate area of the speaker assemblies per 100 sq ft of ceiling area.

SPEAKER ASSEMBLIES FOR FIRE RESISTANCE (CHML)

Speaker assemblies are intended to be installed in accordance with the installation instructions supplied with the product and as described in the individual fire-resistive designs.

RELATED PRODUCTS

For information on related products, see Fire-resistance Ratings – ANSI/UL 263 (BXUV).

Speakers for use in nonhourly-fire-rated ceiling systems and rated for plenum use are covered under Speakers and Amplifiers for Fire-protective Signaling Systems (UUMW).

ADDITIONAL INFORMATION

For additional information, see Fire-resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 263, "Fire Tests of Building Construction and Materials."

Some of these speaker assemblies are provided with an outer enclosure. The insulation material that surrounds the enclosure that is exposed to the airflow in a return air-plenum space has additionally been investigated to ANSI/UL 723, "Test for Surface Burning Characteristics of Building Materials." These materials have a flame spread value of 25 or less and a smoke developed value of 50 or less.

UL MARK

The Classification Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**SPEAKER ASSEMBLY
FIRE RESISTANCE CLASSIFICATION
DESIGN NO(S). _____
SEE UL FIRE RESISTANCE DIRECTORY**

Control No.

or

**SPEAKER ASSEMBLY
FIRE RESISTANCE CLASSIFICATION
SEE UL FIRE RESISTANCE DIRECTORY**

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WALL-OPENING PROTECTIVE MATERIALS (CLIV)

USE AND INSTALLATION

This category covers wall-opening protective materials investigated for use in fire-resistance designs as detailed in Fire-resistance Ratings – ANSI/UL 263 (BXUV). The protective materials are proprietary compositions used to maintain the hourly ratings of fire-resistive walls and partitions containing flush-mounted devices, such as outlet boxes, electrical cabinets and mechanical cabinets.

The Metallic Electrical Outlet Boxes section under **WALL AND PARTITION ASSEMBLIES** in BXUV specifies the conditions under which certified metallic outlet and switch boxes may be installed within fire-resistance-rated wall assemblies constructed with bearing and nonbearing wood or steel studs and gypsum board facings. In addition, Outlet Boxes and Fittings Certified for Fire Resistance (CEYY) includes certifications for nonmetallic outlet boxes along with the conditions under which such outlet and switch boxes may be installed within fire-resistive wall assemblies. With either type of outlet or switch box, it may be possible to install the boxes under less stringent conditions when such boxes are used in conjunction with wall-opening protective materials. The use of wall-opening protective materials may allow for (1) reducing the spacing between boxes contained on opposite sides of the wall, (2) increasing the size of the boxes, (3) increasing the density of boxes installed, and/or (4) allowing the use of boxes on each side of staggered stud walls. The individual certifications indicate the specific applications and the method of installation for which the materials have been investigated. Unless otherwise specified in the individual certifications, all conduit connectors used in conjunction with metallic outlet boxes are intended to be steel.

Electrical devices are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

RELATED PRODUCTS

For information on related products, see Fire Resistance Ratings – ANSI/UL 263 (BXUV).

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

REQUIREMENTS

WALL-OPENING PROTECTIVE MATERIALS (CLIV)

The basic standard used to investigate products in this category is ANSI/UL 263, "Fire Tests of Building Construction and Materials."

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

WALL-OPENING PROTECTIVE MATERIAL
FIRE RESISTANCE CLASSIFICATION
DESIGN NO(S). _____
SEE UL FIRE RESISTANCE DIRECTORY
Control No.

or

WALL-OPENING PROTECTIVE MATERIAL
FIRE RESISTANCE CLASSIFICATION
SEE UL FIRE RESISTANCE DIRECTORY
Control No.

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BUSWAYS, METAL ENCLOSED, OVER 600 VOLTS (CVZW)

GENERAL

This category covers metal-enclosed busways of the nonsegregated phase type, for use in accordance with Article 368 of ANSI/NFPA 70, "National Electrical Code." Nonsegregated phase busway is one in which all phase conductors are in a common metal enclosure without barriers between the phases.

These are assemblies of metal-enclosed conductors, together with associated interconnections, enclosures, and supporting structures.

These assemblies are intended for use on systems with nominal rated voltages from 601 V to 38 kV ac. Current ratings are from 600 to 10,000 A.

These assemblies may be intended for either indoor or outdoor applications. An assembly that has been investigated to determine that it is rainproof is marked "Rainproof," "Outdoor" or "3R."

Enclosures are of the ventilated or nonventilated type. A ventilated enclosure is provided with means to permit circulation of sufficient air to remove excess heat.

A nonventilated enclosure is constructed to provide no intentional circulation of external air through the enclosure.

PRODUCT MARKINGS

These products are marked with the following electrical ratings: rated voltage, rated continuous current, insulation (BIL) level, frequency, rated frequency withstand voltage (dry), and rated short-circuit withstand current (momentary current). When shipped in sections, each section is marked.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/IEEE C37.23 (2003), "IEEE Standard for Metal-Enclosed Bus."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Metal-Enclosed Busway."

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BUSWAYS AND ASSOCIATED FITTINGS (CWFT)

GENERAL

BUSWAYS AND ASSOCIATED FITTINGS (CWFT)

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This category covers busways and associated fittings, rated 600 V or less, 6000 A or less. Busways are grounded metal enclosures containing factory-mounted bare or insulated conductors, which are usually copper or aluminum bars, rods or tubes. These enclosures and, in some cases an additional ground bus, are intended for use as equipment grounding conductors.

Some busways are not intended for use ahead of service equipment and are marked with the maximum rating of overcurrent protection to be used on the supply side of the busway.

Busways may be of one of the following designs:

Lighting Busway — Busway intended to supply and support industrial and commercial luminaires. Lighting busway is limited to a maximum current rating of 50 A.

Trolley Busway — Busway having provision for continuous contact with a trolley by means of a slot in the enclosure. Trolley busway may be additionally marked "Lighting Busway" if intended to supply and support industrial and commercial luminaires.

Continuous Plug-in Busway — Busway provided with provision for the insertion of plug-in devices at any point along the length of the busway. Continuous plug-in busway is intended for general use and may be installed within reach of persons. Busways of this design are limited to a maximum current rating of 225 A.

Short-run Busway — Unventilated busway intended for a maximum run of 30 ft horizontally, 10 ft vertically and are primarily used to supply switchboards. Except for transformer stubs, short-run busway is not intended to have intermediate taps.

USE AND INSTALLATION

Busways are intended for installation in accordance with Article 368 of ANSI/NFPA 70, "National Electrical Code" (NEC), and the manufacturer's installation instructions.

Busways investigated to determine their suitability for

- installation in a specified position,
- for use in a vertical run, or for support at intervals greater than 5 ft,
- for outdoor use

are so marked. This marking is on or contiguous with the name plate incorporating the manufacturer's name and electrical rating.

A busway or fitting containing a vapor seal is so marked, but unless marked otherwise, the busway or fitting has not been investigated for passage through a fire-rated wall.

Busway marked "Lighting Busway" and protected by overcurrent devices rated in excess of 20 A is intended for use only with luminaires employing heavy-duty lampholders unless additional overcurrent protection is provided for the luminaire in accordance with the NEC.

Trolley busway should be installed out of the reach of persons or be otherwise installed to prevent accidental contact with exposed conductors.

Some busways have a number of short stubs and are marked for use with certain compatible equipment.

Busways and fittings covered under this category are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on the terminal connectors and is on a wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14 - 1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger as specified in Table 310.16 of the NEC. Termination provisions are determined based on values provided in Table 310.16 or Section 310.15(B)(6), with no adjustment made for correction factors.

Some fittings are suitable for use as service equipment and are so marked.

PLUG-IN BUSWAY FITTINGS INTENDED FOR USE ON OTHER MANUFACTURERS' BUSWAYS

Busway fittings of the plug-in design may be suitable for use on other manufacturers' continuous plug-in or lighting busways. Busway fittings investigated for use on other manufacturers' busways are limited to fittings incorporating luminaires. Fittings are marked to indicate with which busway they are intended to be used. Fittings intended for this application are limited to short-circuit current ratings of 10 kA, 600 V or less.

RATINGS

Busways and associated fittings marked "Short Circuit Current Rating(s) Maximum RMS Symmetrical Amps ___ Volts ___" have been investigated for the rating indicated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 857, "Busways."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word

"LISTED," a control number, and the product name "Busway," "Short-Run Busway" or "Busway Plug," or other appropriate product name.

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BUSWAYS AND ASSOCIATED FITTINGS CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (CWTN)

This category covers products investigated in accordance with IEC 60439, "Low-Voltage Switchgear and Control Gear Assemblies, Part 1 - Type-Tested and Partially Type-Tested Assemblies and Part 2: Particular Requirements for Busbar Trunking Systems (Busways)." These products may additionally be investigated to IEC 60529, "Degrees of Protection Provided by Enclosures (IP Code)." These products may also be provided with the Listing Mark for Busways and Associated Fittings (CWFT). For additional information, see Busways and Associated Fittings (CWFT).

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

For those products which are also Listed, the Classification Mark includes the appropriate Listing Mark and the statement: "ALSO CLASSIFIED BY UNDERWRITERS LABORATORIES INC. IN ACCORDANCE WITH IEC _____." The designation of the appropriate publications are filled in the blank.

For those products which are not also Listed, the Classification Mark consists of the statement: "CLASSIFIED BY UNDERWRITERS LABORATORIES INC. IN ACCORDANCE WITH IEC _____" and a control number. The designation of the appropriate publications are filled in the blank. Additionally, the Classification Mark may include the UL symbol and the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory).

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CABINETS AND CUTOUT BOXES (CYIV)

GENERAL

This category covers sheet-metal boxes and nonmetallic boxes. Cutout boxes are provided with a door secured by hinges and one or more fasteners and are intended for surface mounting. A cabinet consists of two parts: a cabinet box and a mating cabinet front that contains a door. A cabinet may be flush mounted or surface mounted. These boxes are intended for installation in accordance with Article 312 of ANSI/NFPA 70, "National Electrical Code."

ENVIRONMENTAL RATINGS AND CONDITIONS

Each cabinet and cutout box is marked with one or more of the following Enclosure Type ratings for which it was investigated: Type 1, 2, 3, 3X, 3R, 3RX, 3S, 3SX, 4, 4X, 5, 6, 6P, 12, 12K or 13. The intended uses for each Enclosure Type are as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Cabinets and cutout boxes marked as Type 2, 3R or 3RX enclosures may be marked to indicate the intended mounting orientation, or the location where electrical parts are intended to be installed, or both, where necessary to maintain the designated environmental rating.

Cabinets and cutout boxes marked as Type 3, 3X, 3S, 3SX, 4, 4X, 6, 6P, 12, 12K or 13 have integral mounting means external to the enclosure cavity or may have openings into the enclosure cavity for attachment of separate mounting means supplied with the enclosure or available as a kit referenced from enclosure markings.

ELECTRICAL EQUIPMENT

Some cabinets and cutout boxes are intended for the installation of specific kinds of equipment; however, this category does not cover any electrical material or fittings contained in the box.

RELATED PRODUCTS

Boxes provided with a cover secured by fasteners other than hinges are covered under Boxes, Junction and Pull (BGUZ).

Enclosures investigated for ingress protection in accordance with IEC 60529, "Degrees of Protection Provided by Enclosures (IP Code)," are covered under Degrees of Protection by Enclosures Classified in Accordance with IEC Publications (EOF).

Enclosures intended for use with industrial control panels are covered under Industrial Control Panels (NITW).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 50, "Enclosures for Electrical Equipment, Non-Environmental Considerations," and ANSI/UL 50E, "Enclosures for Electrical Equipment, Environmental Considerations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Cabinet Front," "Electric Cabinet Box" or "Cutout Box."

The product name "Electric Cabinet Front" is for the front trim or matt used on the flush- or surface-mounted cabinet box. The product name "Electric Cabinet Box" is for the box only.

The product name "Cutout Box" is for the surface-mounted box provided with a door.

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CABLE ASSEMBLIES AND FITTINGS FOR INDUSTRIAL CONTROL AND SIGNAL DISTRIBUTION (CYJV)

USE

This category covers cable assemblies, male and female cable fittings, panel-mounted fittings and fittings used with industrial control equipment in accordance with Article 725 of ANSI/NFPA 70, "National Electrical Code" (NEC). These assemblies are intended to be used in an industrial environment to distribute the control signals to remote proximity switches or other control circuit devices. The cable assemblies and mating fittings are not intended to be used as a substitute for the fixed wiring of the building structure. These devices are intended for use only with the Listee's same line of products covered under this category.

Cable assemblies and fittings are rated in volts and amperes. The devices are marked with such rating on the device or smallest unit shipping container. The products covered under this category are not intended for interruption of current and are so marked.

Cable Assemblies — Cable assemblies consist of a length of flexible cord with a molded-on or assembled-on male or female connector on at least one end of the cable. Cable assemblies with only one end terminated are intended for direct connection to a proximity switch, control panel, or similar device.

Male and Female Cable Fittings — Fittings intended to be field-wired onto flexible cord may have a male or female insert configuration. The diameter and the wire size of the flexible cord to which the fitting is intended to be assembled is indicated on the fitting or the smallest unit shipping container.

Panel-mounted Fittings — These fittings consist of a panel-mounted assembly with either a male or female insert. Each assembly is provided with a means to secure to a panel. These fittings may be provided with leads intended for direct wiring connection to a control panel, proximity switch, or other similar device.

Tap Fittings — Tap fittings consist of field-wiring terminals for feed-through connection to power-limited tray cable or other appropriate cable together with either a female connector to connect to a cable assembly or field wiring terminals to connect to flexible cord suitable for hard use that is the same size and ampacity as the cable. Tap fittings are intended for use within outlet boxes supported by cable trays in Class 1 power-limited circuits to provide a point of connection to the fixed wiring of the building structure. They may also be installed on Type PLTC cable on open wiring in Class 2 circuits in accordance with Section 725.61(D)(4) of the NEC. They have been investigated for electrical insulation, mechanical strength, temperature rise, fault current withstand and effectiveness of grounding path to demonstrate equivalency to the wiring system on which they are intended to be installed.

ADDITIONAL INFORMATION

CABLE ASSEMBLIES AND FITTINGS FOR INDUSTRIAL CONTROL AND SIGNAL DISTRIBUTION (CYJV)

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2238, "Cable Assemblies and Fittings for Industrial Control and Signal Distribution."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cable Assembly for Industrial Control and Signal Distribution," "Cable Assembly Fitting for Industrial Control and Signal Distribution," "CYJV Cable Assembly" or "CYJV Cable Assembly Fitting."

The cable assemblies that have terminations on one end only may be bulk labeled with the Listing Mark provided on the smallest unit shipping container. All other Listing Marks are applied to each individual device.

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CABLE ASSEMBLIES FOR INDUSTRIAL CONTROL AND SIGNAL DISTRIBUTION FOR USE IN HAZARDOUS LOCATIONS (CYJX)

USE

This category covers cable assemblies, cable plugs and sockets, panel-mounted plugs and sockets, and plugs and sockets used for interconnection

- between one piece of electrical equipment and another piece of electrical equipment (by means of a cable or cord assembly involving plugs and sockets on both ends, or a plug and socket on one end and unterminated cable or cord on the other), or
- between premises wiring and a piece of electrical equipment (by means of a cable or cord assembly involving a socket on the equipment end and unterminated cable or cord on the premises wiring end).

This interconnection is in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), and ANSI/NFPA 79, "Electrical Standard for Industrial Machinery." These assemblies are intended to be used in locations that are classified as Class I, Division 2 to distribute the control signals to remote proximity switches or other control-circuit devices.

Each cable assembly is provided with means to mechanically secure the plug or socket on either end of the cable assembly to the intended equipment plug or socket so as to protect against unintentional separation. The means used to provide this mechanical securement is constructed as follows:

1. separation shall be possible only with the aid of a tool,
2. when not secured, the means shall be captive to the cable assembly, and
3. a marking is provided that is likely to be readily visible after installation that reads, "WARNING - Do Not Connect or Disconnect When Energized," or equivalent.

Note: The warning marking may be on the securement means or on the cable assembly. It may be necessary to provide more than one warning marking for ready visibility.

Instructions are provided indicating that, should the cable assembly become separated from the intended equipment plug or socket, the part that remains energized is a socket outlet.

This category does not cover cable assemblies with plugs on both ends.

Product Types

The following products are covered under this category:

Cable Assemblies — Cable assemblies consist of a length of cord or cable as follows:

1. extra-hard-usage cord,
2. instrumentation tray cable (Type ITC) for applications involving instrumentation and control circuits, or
3. power-limited tray cable (Type PLTC) for applications involving remote-control, signaling, and power-limited circuits.

Note: See the following Code references for additional details on these wiring methods:

For extra-hard-usage cord, see Article 400 of the NEC.

For instrumentation tray cable (Type ITC), see Article 727 of the NEC.

CABLE ASSEMBLIES FOR INDUSTRIAL CONTROL AND SIGNAL DISTRIBUTION FOR USE IN HAZARDOUS LOCATIONS (CYJX)

For power-limited tray cable (Type PLTC), see Article 725 of the NEC.

The cord or cable is terminated on at least one end with a molded-on or assembled-on plug or socket. Cable assemblies with only one end terminated are intended for direct connection to a proximity switch, control panel, or similar device.

Cable Plugs and Sockets — Plugs and sockets intended to be field wired or molded onto cord or cable as indicated under **Cable Assemblies** above may have a male or female insert configuration. The diameter and the wire size of the field-wired cord or cable to which the plug or socket is intended to be assembled is indicated on the plug or socket or the smallest unit shipping container.

Panel-mounted Plugs and Sockets — These plugs and sockets consist of a panel-mounted assembly with either a plug or socket. Each assembly is provided with a means to secure to a panel. These plugs and sockets may be provided with leads intended for direct wiring connection to a control panel, proximity switch, or other similar device.

RATINGS

These cable assemblies are rated based on the involved cord or cable as follows:

1. extra-hard-usage cord for applications involving circuits operating at 600 V or less and 60 A or less,
2. instrumentation tray cable (Type ITC) for applications involving instrumentation and control circuits operating at 150 V or less and 5 A or less, or
3. power-limited tray cable (Type PLTC) for applications involving remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power source.

Cable assemblies and plugs and sockets are rated in volts and amperes. The devices are marked with such rating on the device or smallest unit shipping container.

SPECIAL CONSIDERATIONS

The cable assemblies and mating plugs and sockets are not intended to be used as a substitute for the fixed wiring methods required by 501.10 of the NEC.

These cable assemblies and mating plugs and sockets are intended for use only with the Listee's same line of cable assemblies and mating plugs and sockets covered under this category.

The products covered under this category are not intended for interruption of current and are so marked.

These devices are intended for indoor use only, unless otherwise so identified.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 2238, "Cable Assemblies and Fittings for Industrial Control and Signal Distribution."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

Note: The unclassified locations use of the term "fitting" in ANSI/UL 2238 is equivalent to the hazardous (classified) locations use of the terms "plug" or "socket."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cable Assembly for Industrial Control and Signal Distribution for Use in Hazardous Locations," "Cable Assembly Plug for Industrial Control and Signal Distribution for Use in Hazardous Locations," "Cable Assembly Socket for Use in Hazardous Locations," "CYJX Cable Assembly for Use in Hazardous Locations," "CYJX Cable Assembly Plug for Use in Hazardous Locations" or "CYJX Cable Assembly Socket for Use in Hazardous Locations." The words "Hazardous Locations" may be abbreviated "Haz. Loc."

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CABLE ASSEMBLIES FOR INDUSTRIAL CONTROL AND
SIGNAL DISTRIBUTION FOR USE IN ZONE CLASSIFIED
HAZARDOUS LOCATIONS (CYJZ)

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CABLE ASSEMBLIES FOR INDUSTRIAL CONTROL AND SIGNAL DISTRIBUTION FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (CYJZ)

USE

This category covers cable assemblies, cable plugs and sockets, panel-mounted plugs and sockets, and plugs and sockets used for interconnection between one piece of electrical equipment and another piece of electrical equipment (by means of a cable or cord assembly involving plugs and sockets on both ends, or a plug and socket on one end and unterminated cable or cord on the other), or between premises wiring and a piece of electrical equipment (by means of a cable or cord assembly involving a socket on the equipment end and unterminated cable or cord on the premises wiring end).

This interconnection is in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), and ANSI/NFPA 79, "Electrical Standard for Industrial Machinery." These assemblies are intended to be used in locations that are classified as Class I, Zone 2 to distribute the control signals to remote proximity switches or other control-circuit devices.

Each cable assembly is provided with means to mechanically secure the plug or socket on either end of the cable assembly to the intended equipment plug or socket so as to protect against unintentional separation. The means used to provide this mechanical securement is constructed as follows:

1. separation shall be possible only with the aid of a tool,
2. when not secured, the means shall be captive to the cable assembly, and
3. a marking is provided that is likely to be readily visible after installation that reads, "WARNING – Do Not Connect or Disconnect When Energized," or equivalent.

Note: The warning marking may be on the securement means or on the cable assembly. It may be necessary to provide more than one warning marking for ready visibility.

Instructions are provided indicating that, should the cable assembly become separated from the intended equipment plug or socket, the part that remains energized is a socket outlet.

This category does not cover cable assemblies with plugs on both ends.

Product Types

The following products are covered under this category:

Cable Assemblies — Cable assemblies consist of a length of cord or cable as follows:

1. extra-hard-usage cord,
2. instrumentation tray cable (Type ITC) for applications involving instrumentation and control circuits, or
3. power-limited tray cable (Type PLTC) for applications involving remote-control, signaling, and power-limited circuits.

Note: See the following Code references for additional details on these wiring methods:

- For extra-hard-usage cord, see Article 400 of the NEC.
- For instrumentation tray cable (Type ITC), see Article 727 of the NEC.
- For power-limited tray cable (Type PLTC), see Article 725 of the NEC.

The cord or cable is terminated on at least one end with a molded-on or assembled-on plug or socket. Cable assemblies with only one end terminated are intended for direct connection to a proximity switch, control panel, or similar device.

Cable Plugs and Sockets — Plugs and sockets intended to be field wired or molded onto cord or cable as indicated under **Cable Assemblies** above may have a male or female insert configuration. The diameter and the wire size of the field-wired cord or cable to which the plug or socket is intended to be assembled is indicated on the plug or socket or the smallest unit shipping container.

Panel-mounted Plugs and Sockets — These plugs and sockets consist of a panel-mounted assembly with either a plug or socket. Each assembly is provided with a means to secure to a panel. These plugs and sockets may be provided with leads intended for direct wiring connection to a control panel, proximity switch, or other similar device.

RATINGS

These cable assemblies are rated based on the involved cord or cable as follows:

1. extra-hard-usage cord for applications involving circuits operating at 600 V or less and 60 A or less,
2. instrumentation tray cable (Type ITC) for applications involving instrumentation and control circuits operating at 150 V or less and 5 A or less, or
3. power-limited tray cable (Type PLTC) for applications involving

CABLE ASSEMBLIES FOR INDUSTRIAL CONTROL AND
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remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power source.

Cable assemblies and plugs and sockets are rated in volts and amperes. The devices are marked with such rating on the device or smallest unit shipping container.

SPECIAL CONSIDERATIONS

The cable assemblies and mating plugs and sockets are not intended to be used as a substitute for the fixed wiring methods required by 505.15 of the NEC.

These cable assemblies and mating plugs and sockets are intended for use only with the Listee's same line of cable assemblies and mating plugs and sockets covered under this category.

The products covered under this category are not intended for interruption of current and are so marked.

These devices are intended for indoor use only, unless otherwise so identified.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 2238, "Cable Assemblies and Fittings for Industrial Control and Signal Distribution."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

Note: The unclassified locations use of the term "fitting" in ANSI/UL 2238 is equivalent to the hazardous (classified) locations use of the terms "plug" or "socket."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cable Assembly for Industrial Control and Signal Distribution for Use in Hazardous Locations," "Cable Assembly Plug for Industrial Control and Signal Distribution for Use in Hazardous Locations," "Cable Assembly Socket for Industrial Control and Signal Distribution for Use in Hazardous Locations," "CYJZ Cable Assembly for Use in Hazardous Locations," "CYJZ Cable Assembly Plug for Use in Hazardous Locations" or "CYJZ Cable Assembly Socket for Use in Hazardous Locations." The words "Hazardous Locations" may be abbreviated "Haz. Loc."

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CABLE FITTINGS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (CYMJ)

USE

This category covers cable termination fittings and combination cable termination and sealing fittings for threaded connection of cable to equipment in Class I, Zone classified hazardous locations as indicated in the individual certifications. The termination and sealing fittings are intended for use only with sealing compound as specified by the manufacturer in instructions furnished with the fitting.

These devices are intended for use in sealing the conductors and outer jackets of certified cable of the type indicated in the individual certifications. No splices of conductors are permitted to be made in the fitting. Restrictions on position and/or location of the sealing fitting are indicated in the manufacturer's instructions.

ANSI/NFPA 70, "National Electrical Code," does not permit the use of elastomeric seals in flameproof cable fittings.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 2225, "Cables and Cable Fittings for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufac-

CABLE FITTINGS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (CYMJ)

tured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Type + Cable Sealing Fitting for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

+ Generic cable designation, such as MC-HL, ITC-HL, etc.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CABLE SEALING FITTINGS FOR USE IN HAZARDOUS LOCATIONS (CYMX)

USE

This category covers combination termination and sealing fittings for threaded connection of cables to equipment in Class I, Division 1 and Division 2, and/or Class II, Division 1 and 2 hazardous locations, as indicated in the individual certifications. They are intended for use only with sealing compound as specified by the manufacturer in instructions furnished with the fitting.

These devices are intended for use in sealing the conductors and outer jackets of certified cable of the type indicated in the individual certifications. No splices of conductors are permitted to be made in the fitting. Restrictions on position and/or location of the sealing fitting are indicated in the manufacturer's instructions.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 2225, "Cables and Cable Fittings for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Type + Cable Sealing Fitting for Use in Hazardous Locations."

+ Generic cable designation, such as MC, MC-HL, TC, TC-HL, etc.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CABLE TRAYS (CYNW)

USE

This category covers cable trays intended for assembly in the field and for use in accordance with Article 392 of ANSI/NFPA 70, "National Electrical Code" (NEC). They have been certified as to their suitability for use as equipment grounding conductors in accordance with Sections 392.60(A) and 392.60(B) of the NEC. The cable trays are marked on the outer surface of the sidewall of the tray indicating the cross-sectional area of the grounding metal.

INSTALLATION

Cable-tray assemblies have been investigated for bonding between sections using the minimum hardware provided by the manufacturer. The manufacturer may supply cable-tray sections and fittings without a positive mechanical means for completing the grounding connection. Assemblies not provided with positive mechanical grounding connections are intended to be bonded with mechanical connectors or bonding jumpers provided by the installer, in accordance with 392.60(B)(4) of the NEC.

RELATED PRODUCTS

For nonmetallic-cable trays, see Cable Trays, Nonmetallic (CYOV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification

CABLE TRAYS (CYNW)

and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

CABLE TRAY AS TO ITS SUITABILITY AS AN EQUIPMENT GROUNDING CONDUCTOR ONLY Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CABLE TRAYS, NONMETALLIC (CYOV)

USE

This category covers nonmetallic, including fiberglass (fiberglass-reinforced plastic) cable tray systems installed for the support of power and/or control cable. Nonmetallic cable trays are intended for assembly in the field and for use in accordance with Article 392 of ANSI/NFPA 70, "National Electrical Code."

Cable trays are intended to be installed in accordance with NEMA VE 2, "Cable Tray Installation Guidelines," or as recommended by the manufacturer. Cable trays are marked with load/span ratings and may additionally be marked with Class designations A, B, C, D or E. These Class designations represent the static weight supportable by cable tray spans.

Span (ft)	Load (lb/linear foot)				
	Class A	Class B	Class C	Class D	Class E
20	50	75	100	45	75
16	50	75	100	—	—
12	50	75	100	—	—
10	25	—	65	120	200
8	50	75	100	—	—

These nonmetallic cable trays are constructed of flame-retardant material, provide a degree of voltage isolation, are investigated for the effects of low-temperature handling, and are suitable for outdoor use.

Nonmetallic cable trays have not been investigated for use in air-handling spaces.

The investigation of nonmetallic cable trays does not include the support system.

RELATED PRODUCTS

For metallic cable trays, see Cable Trays (CYNW).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 568, "Nonmetallic Cable Tray Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonmetallic Cable Tray."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CAMERA EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (CYPB)

GENERAL

This category covers cameras and pan-and-tilt drives.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

CAMERA EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (CYPB)

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 60065, "Audio, Video, and Similar Electronic Apparatus - Safety Requirements."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Camera for Use in Hazardous Locations" or "Pan and Tilt Drive for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CAMERA EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (CYPH)

GENERAL

This category covers camera equipment, such as cameras and pan and tilt drives.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Camera for Use in Hazardous Locations" or "Pan and Tilt Drive for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CAPACITORS (CYWT)

GENERAL

This category covers general-use power factor correction units rated 600 V maximum. These assemblies employ integrally protected capacitors investigated under Capacitors (CYWT2).

This category does not cover power factor correction units with integral automatic controls or power factor correction unit controllers.

USE AND INSTALLATION

These units are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," and are intended for indoor use, unless otherwise indicated. This information, together with other restrictions of use, such as mounting means and special electrical connections, are detailed in the manufacturer's installation instructions furnished with the product.

RELATED EQUIPMENT

Power factor correction units with integral automatic controls are covered under Industrial Control Panels (NITW).

Power factor correction controllers are covered under Power Circuit and Motor-mounted Apparatus (NMTR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is Part II of ANSI/UL 810, "Capacitors."

UL MARK

CAPACITORS (CYWT)

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Factor Correction Unit" or "Capacitor Bank," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CARBON MONOXIDE ALARMS, SINGLE AND MULTIPLE STATION (CZHF)

GENERAL

This category covers single- and multiple-station carbon monoxide alarms, intended to be employed in indoor locations, as a travel alarm and for use in recreational vehicles.

Single-station Type — Single-station carbon monoxide alarms are self-contained units that incorporate a sensor and related electrical components to initiate an audible alarm signal from the unit when an abnormal amount of carbon monoxide actuates the unit. These devices may be energized from (1) a commercial power-supply source by means of permanent wiring in accordance with ANSI/NFPA 70, "National Electrical Code," or a flexible power-supply cord and plug, (2) use of limited-energy cable or equivalent wiring connected to the output of a suitable Class 2 power supply, or (3) by one or more batteries.

Where a battery is employed as a main supply, its depletion below the level at which an alarm signal would be obtained is indicated by a distinctive audible trouble signal that persists for at least seven days.

Multiple-station Type — Multiple-station carbon monoxide alarms are similar to single-station units but are provided with leads or terminals to permit the interconnection of single-station units so that actuation of any one unit results in the actuation of audible alarms of all units. The installation instructions indicate the maximum number of units that can be interconnected. Refer to the instruction manual provided with each alarm for installation data.

Travel Alarm — A travel alarm consists of a carbon monoxide alarm provided with a mounting bracket for temporary mounting only. Its use is indicated on the UL Certification Mark.

Alarms for Recreational Vehicles — These devices are investigated for the more stringent environmental and operational conditions encountered in recreational vehicles as described in the designated sections of ANSI/UL 2034.

Where applicable, supplementary devices and accessories for use with these units, such as a remote horn, are indicated in the individual certifications.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2034, "Single and Multiple Station Carbon Monoxide Alarms."

UL MARK

The Signaling Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and one of the following product names as appropriate:

- "Single-station Carbon Monoxide Alarm"
- "Multiple-station Carbon Monoxide Alarm"
- "Single- and/or Multiple-station Carbon Monoxide Alarm"
- "Single- and/or Multiple-station Carbon Monoxide Alarm Accessory"
- "Travel Carbon Monoxide Alarm"
- "Single-station Carbon Monoxide Alarm - Also Suitable as Travel Carbon Monoxide Alarm"
- "Single-station Carbon Monoxide Alarm - Also Suitable for Use in Recreational Vehicles"
- "Single-station Carbon Monoxide Alarm - Also Suitable for Use in Recreational Vehicles as a Travel Carbon Monoxide Alarm"
- "Single-station Smoke Alarm - Also Suitable as a Single-station Carbon Monoxide Alarm"
- "Multiple-station Smoke Alarm - Also Suitable as a Multiple-station Carbon Monoxide Alarm"

CARBON MONOXIDE ALARMS, SINGLE AND MULTIPLE STATION (CZHF)

“Single- and/or Multiple-station Smoke Alarm – Also Suitable as a Single- and/or Multiple-station Carbon Monoxide Alarm”
 “Single-station Smoke and/or Carbon Monoxide Alarm Accessory – Also Suitable for Use as a Home Health Care Control Unit”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or

CASTERS, RUBBER, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (CZXX)

GENERAL

This category covers electrically conductive rubber casters which have metal shafts and forks, and are provided with conductive rubber composition wheels or with metal wheels having conductive rubber tires. The casters are intended for use on portable equipment in hospital operating rooms.

Tests indicate that static electrical charges are discharged through these casters when in contact with ground or suitable electrically conductive floor, and that the electrical resistance conforms to the requirements of ANSI/NFPA 99, “Health Care Facilities Code.”

Oil is injurious to rubber compounds and impairs the electrically conductive properties of these casters. The use of floor oils and oily sweeping compounds should therefore be avoided. Insulating floor waxes should not be used.

Conductive floors are required for the proper dissipation of static electrical charges by these casters; see Flooring, Electrically Conductive, Relating to Hazardous Locations (INFZ).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1067, “Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electrically Conductive Rubber Caster Relating to Hazardous Locations.”

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CENTRIFUGES FOR USE IN HAZARDOUS LOCATIONS (DAZV)

GENERAL

This category covers centrifuges designed for use in hazardous (classified) locations. They have been investigated with respect to risk of explosion, fire, electric shock, and injury to persons.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Centrifuge for Use in Hazardous Locations.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTOR-OPERATED CHECK-OUT STANDS (DBNT)

MOTOR-OPERATED CHECK-OUT STANDS (DBNT)

USE

This category covers motor-operated check-out stands intended for use in retail stores to facilitate tally and packing operations. These check-out stands are intended to be installed in accordance with ANSI/NFPA 70, “National Electrical Code.” Foot and knee controls are also covered under this category.

RELATED PRODUCTS

Self-check-out stands not provided with a motorized belt are covered under Custom-built Kiosks (EMHH).

Point-of-sale cabinets not provided with a motorized belt are covered under Wired Cabinets (ZNXR) or Furniture, Powered and Nonpowered (YNE).

Barcode scanners and cash registers are covered under Information Technology Equipment Including Electrical Business Equipment (NWGQ).

Conveyors that do not form a component part of a check-out stand are covered under Conveyors (EJR).

Scales are covered under Scales and Accessories, Electronic (TUTT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 73, “Motor-Operated Appliances.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Check Out Stand.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SEASONAL AND HOLIDAY DECORATIVE PRODUCTS (DGVT)

This category covers temporary use, seasonal decorative lighting products and accessories with a maximum input rating of 120 V ac. Temporary use is considered to be a period of installation and use not to exceed 90 days per year. A seasonal product is a product painted in colors to suggest a holiday theme or a snow covering, a figure in a holiday costume, or any decoration associated with a holiday or a particular season of the year.

Products covered under this category are factory assembled, portable, and intended for connection to a receptacle.

In Listing seasonal and holiday decorative products, it is assumed that any medium base, intermediate base, candelabra base, miniature base or midjet-base lamps to be used in these products are made in accordance with American National Standards Institute specifications, as well as the applicable requirements in ANSI/UL 588, “Seasonal and Holiday Decorative Products.” The use of lamps that are not in conformance with such standards may present shock hazards or high temperature conditions that are in excess of safe limits of operation.

This category does not cover nonseasonal lighting, nonseasonal products, permanently connected products, nondecorative lighting intended for general illumination only, cord sets (extension cords) or relocatable power taps.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SEASONAL AND HOLIDAY DECORATIVE PRODUCT ACCESSORIES (DGWU)

GENERAL

This category covers accessories intended for use with decorative-lighting strings and decorative outfits. This includes such items as flasher controllers with or without sound, and other miscellaneous devices that provide a decorative effect for use with decorative-lighting strings and decorative outfits. The accessories may be in the form of a direct plug-in type.

PRODUCT CATEGORIES BY CATEGORY CODE

**SEASONAL AND HOLIDAY DECORATIVE PRODUCTS
(DGV)**
**Seasonal and Holiday Decorative Product Accessories
(DGWU)—Continued**

This category does not cover decorative lamps, decorative-lighting strings, decorative outfits, electric ornaments, cord sets (extension cords), temporary power taps, decorative-lighting harnesses, or any other nondecorative-lighting products.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 588, "Seasonal and Holiday Decorative Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Decorative Outfit Accessory."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRIC ORNAMENTS (DGXC)
USE

This category covers electric ornaments, which are units provided with input leads and adapters intended to take the place of push-in lamps in a series-connected decorative-lighting string or decorative outfit. An ornament may be electronically or nonelectronically operated.

An electronically operated ornament employs at least one of the following: a motor, a printed wiring assembly, electronic components, or the like. This type of ornament may produce sound, be illuminated, animated, or the like, or any combination of the above.

A nonelectronically operated ornament is provided with a wiring assembly consisting of only a lamp and lampholder on one end and an adapter on the other end. This type of ornament is illuminated only.

ADDITIONAL INFORMATION

For additional information, see Seasonal and Holiday Decorative Products (DGV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 588, "Seasonal and Holiday Decorative Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Ornament."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LAMPS, DECORATIVE (DGXO)
GENERAL

This category covers intermediate and candelabra-base lamps for use in certified decorative-lighting strings and outfits.

These lamps have been investigated in accordance with Supplement SA of ANSI/UL 588, "Seasonal and Holiday Decorative Products." These lamps have been investigated with respect to lamp base gauging, exposure of live parts, envelope-to-base securement, center- and side-filament protrusion, and lamp-envelope temperature.

PRODUCT MARKINGS

In addition to the Certification Mark, the lamp or the smallest unit container is marked with the wattage, voltage, lamp type, manufacturer's identification and model or catalog number. Each lamp is marked with the manufacturer's identification, rated voltage and wattage.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 588, "Seasonal and Holiday Decorative Products."

SEASONAL AND HOLIDAY DECORATIVE PRODUCTS (DGV)
Lamps, Decorative (DGXO)—Continued
UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**DECORATIVE LAMP
FOR USE IN LISTED DECORATIVE
LIGHTING STRINGS AND OUTFITS
Control No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

OUTFITS, DECORATIVE (DGXW)
USE

This category covers decorative outfits intended for seasonal, temporary use, not to exceed 90 days per year, and includes factory-assembled decoration units providing a seasonal theme, such as wreaths, stars, light sculptures, crosses, candles or candle sets without lamp shades, products in the shape of, or in resemblance to, a Christmas tree not exceeding 30 in. (762 mm) in height as measured from the top of the tree to the bottom of the base of the tree and provided with simulated branches and needles, products in the shape of, or in resemblance to, a wreath not exceeding 48 in. (1219 mm) in outer diameter and provided with simulated branches and needles, blow-molded figures or objects, animated figures, tree tops, controllers, tree stands, and motorized decorative displays.

Decorative outfits are intended for connection to a receptacle by means of an attachment plug and are portable. Decorative outfits are marked with the maximum number of strings, of the same type, to be connected together for series-connected outfits or the maximum number of lampholders for outfits that are parallel connected. Parallel-type products should not be intermixed with series-type products. Decorative outfits are not intended to be permanently connected, and are not intended to be used as toys.

RELATED PRODUCTS

This category does not cover decorative-lighting strings or electric ornaments; refer to Strings, Decorative Lighting (DGZZ) and Electric Ornaments (DGXC), respectively.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 588, "Seasonal and Holiday Decorative Products."

Christmas trees exceeding 30 in. (762 mm) in height but not exceeding 12 ft (3.7 m) in height, as measured from the top of the tree to the bottom of the base of the tree and provided with simulated branches and needles, products in the shape of, or in resemblance to, a wreath exceeding 48 in. (1219 mm) in outer diameter and provided with simulated branches and needles, or other similar seasonal-use decorative outfits have additionally been investigated to UL Subject 2358, "Outline of Investigation for Fire Tests of Pre-lit Artificial Seasonal Use Trees and Other Seasonal Decorative Items."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Decorative Outfit."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

STRINGS, DECORATIVE LIGHTING (DGZZ)
USE

This category covers decorative-lighting strings intended for seasonal, temporary use, not to exceed 90 days per year, consisting of a string of lights that may be draped over or around trees or other objects for decorative effect. Decorative-lighting strings are factory assembled with replaceable or nonreplaceable lamps and are connected by means of an attachment plug

Strings, Decorative Lighting (DGZZ)—Continued

or the like. Series-connected lighting strings using LED lamps that employ nonremovable covers or diffusers are also considered decorative-lighting strings.

Strings are not intended for installation on artificial trees employing metal or metalized plastic needles, leaves or branch coverings. They also should not be installed in a manner that can cut or damage wire insulation.

Decorative-lighting strings are not intended to be permanently connected or provide general illumination.

PRODUCT MARKINGS

Decorative-lighting strings intended for indoor use only include, as part of the attached Listing Mark, the statement "For Indoor Use Only." In addition, the UL Mark and the word "LISTED" are printed in green ink.

Decorative-lighting strings for indoor and outdoor use include, as part of the attached Listing Mark, the statement "For Indoor Use and Outdoor Use." In addition, the UL Mark and the word "LISTED" are printed in red ink.

Decorative-lighting strings are marked with the maximum number of strings, of the same type, to be connected together for series-connected lighting strings or the maximum number of lampholders for lighting strings that are parallel connected. Parallel-type strings should not be intermixed with series type strings. Each string is marked with its type.

RELATED PRODUCTS

Decorative-lighting strings provided with individual lamp shades or diffusers over each individual lamp and decoration units other than strings are covered under Outfits, Decorative (DGXW), Seasonal and Holiday Decorative Product Accessories (DGWU) and Electric Ornaments (DGXC).

Decorative-lighting strings do not employ lampholders larger than intermediate base and do not include temporary-lighting strings. Construction of strings that employ larger than intermediate base lampholders are covered under Temporary-lighting Strings (XBRT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 588, "Seasonal and Holiday Decorative Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Decorative-lighting String for Indoor Use Only" or "Decorative-lighting String for Indoor Use and Outdoor Use."

The Listing Mark for this category requires the use of a holographic label.

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CIRCUIT BREAKERS (DHJR)

USE

This category covers circuit breakers which, unless otherwise noted, are of the manually operable, air break type, providing automatic overcurrent protection.

PRODUCT MARKINGS AND RATINGS

These circuit breakers and circuit breaker enclosures are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings are independent of any marking on terminal connectors and are located on a wiring diagram or another readily visible location.

1. Circuit breaker enclosures are marked to indicate the temperature rating of all field installed conductors.
2. Circuit breakers with a current rating of 125 A or less are marked as being suitable for 60°C, 75°C only or 60/75°C rated conductors. It is acceptable to use conductors with a higher insulation rating, if the ampacity is based on the conductor temperature rating marked on the breaker.
3. Circuit breakers rated 125 A or less and marked suitable for use with 75°C rated conductors are intended for field use with 75°C rated conductors at full 75°C ampacity only when the circuit breaker is installed in a circuit breaker enclosure or individually mounted in an industrial control panel with no other component next to it, unless the end-use equipment (panelboard, switchboard, service equipment, power outlet, etc.) is also marked suitable for use with conductors rated 75°C.

PRODUCT CATEGORIES BY CATEGORY CODE

4. A circuit breaker with a current rating of more than 125 A is suitable for use with conductors rated 75°C.
5. Circuit breakers intended for continuous operation at 100% of rated current may be marked to be connected with 90°C rated wire with the size based on 75°C ampacity.

A suitable marking is required in a circuit breaker enclosure, whether or not terminals are mounted therein, if it is intended that the breaker to be mounted therein is to be used with aluminum wire.

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ADAPTERS, CIRCUIT BREAKER (DHWZ)

USE AND INSTALLATION

This category covers equipment designed to adapt circuit breakers to receiving devices, such as panelboards, panel base assemblies, etc. Field installation is intended only in those receiving devices specifically marked for their use.

Circuit-breaker adapters intended for field installation are provided with installation instructions unless the construction makes the installation obvious.

PRODUCT MARKINGS

Circuit-breaker adapters are marked with a catalog number or the equivalent and the name or trademark of the manufacturer.

Markings to identify the circuit breakers and/or circuit-breaker frames with which the adapter is intended to be used is marked either on a label affixed to the device, imprinted on the smallest packaging, or included as part of the installation instructions.

RELATED PRODUCTS

See Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Breaker Adapter."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CIRCUIT-BREAKER ACCESSORIES (DIHS)

USE

This category covers accessories, such as manual and electrical operators, shunt trip devices, undervoltage trip devices, alarm switches and auxiliary switches, intended for field installation for use only with specific circuit-breaker types. Correct combinations of circuit breakers and accessories are indicated by markings on or with the accessory and/or the circuit breaker.

RELATED PRODUCTS

See Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ) and Circuit-breaker Accessories for Use in Communications Equipment (DITX).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a

Circuit-breaker Accessories (DIHS)—Continued

control number, and the product name "Circuit Breaker Accessory" (or "C.B. Acc."), or the name of the specific product, such as "Undervoltage Trip Relay."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CIRCUIT BREAKERS AND SURGE-PROTECTIVE DEVICES (DIMV)

USE AND INSTALLATION

This category covers combination circuit breaker and surge-protective devices (SPDs) incorporating overcurrent protection, and surge protection designed for repeated limiting of transient-voltage surges as specified in ANSI/UL 1449, "Surge Protective Devices" (3rd edition), on 50 or 60 Hz power circuits not exceeding 600 V.

The combination circuit breaker and SPD is a factory-assembled device, with the SPD either internal or external to the circuit breaker. When the SPD is external to the circuit breaker, the circuit breaker, SPD, internal wiring, mounting means, etc., is provided as a single unit.

They are intended for installation in circuit-breaker enclosures, panelboards, and the like, on grounded 60 Hz alternating-current power circuits in accordance with ANSI/NFPA 70, "National Electrical Code."

RELATED PRODUCTS

See Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ) and Surge-protective Devices (VZCA).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate the circuit-breaker portion of products in this category is ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures."

The basic standard used to investigate surge protection in this category is ANSI/UL 1449, "Surge Protective Devices" (3rd edition).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Breaker and Surge Protective Device" (or "Circuit Breaker and SPD").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CIRCUIT-BREAKER CURRENT LIMITERS (DIRW)

GENERAL

This category covers circuit-breaker current limiters designed to be used in conjunction with specific circuit breakers and to be directly connected to the load terminals of the circuit breakers. They contain fusible elements that function only to increase the fault-current-interrupting ability of the combination, which is intended for use in the same manner as circuit breakers when installed at the service and as branch-circuit protection. The limiters are rated 600 V or less.

The fusible elements in circuit-breaker current limiters are so coordinated that they function at currents below those specified in short-circuit test requirements for circuit breakers. Except for this feature of short-circuit operation, combinations of circuit breakers and circuit-breaker current limiters meet all requirements applicable to branch-circuit and service circuit breakers and, in addition, are required to clear circuits up to and including 25 times their amp rating, and circuits of 1000 A or less regardless of amp rating, without causing operation of the fusible elements in the current limiter.

USE AND INSTALLATION

An interrupting rating on a circuit-breaker current limiter included in a piece of equipment does not automatically qualify the equipment in which the combination is installed for use on circuits with higher available currents than the rating of the equipment itself.

The combination of circuit breaker and circuit-breaker current limiter is intended to be mounted in certified enclosures.

Circuit-breaker Current Limiters (DIRW)—Continued

Equipment (such as panelboards, service equipment, and dead-front switchboards) suitable for use with the combination of circuit-breaker current limiter and circuit breaker is marked to indicate that both may be used.

Circuit-breaker current limiters are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings are independent of any marking on terminal connectors and shall be readily visible.

Unless the circuit-breaker current limiter is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60°C wire in circuits rated 100 A or less, and the use of 75°C wire for higher amp-rated circuits.

PRODUCT MARKINGS

Circuit-breaker current limiters are marked to indicate the breakers with which they are intended to be used.

Circuit-breaker current limiters marked "Current Interrupting Rating(s), MAXIMUM RMS SYM. AMPERES ____ VOLTS ____" have been investigated in conjunction with the circuit breaker and found suitable for the marked interrupting rating.

RELATED PRODUCTS

See Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Breaker Current Limiter."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CIRCUIT BREAKERS FOR USE IN COMMUNICATIONS EQUIPMENT (DITT)

USE

This category covers dc-rated circuit breakers intended to provide branch-circuit protection in communications circuits.

The acceptability of circuit breakers at 100% of the ampere rating is determined in the end product.

Circuit breakers that may be used in ambient at temperatures other than 25°C are marked with either a maximum ambient temperature or a range of temperatures.

These circuit breakers have not been investigated for use on motor circuits.

RELATED PRODUCTS

See Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures," and ANSI/UL 489A, "Circuit Breakers for Use in Communications Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Circuit Breaker for Use in Communication Equipment" (or "Cir. Bkr. for Use in Comm. Equip."), "Communications Equipment Circuit Breaker" (or "Comm. Equip. Cir. Bkr."), "Circuit Breaker for Use in Communications Equipment" (or "Cir. Bkr. for Use in Comm. Equip."), "Communication Equipment Circuit Breaker" (or "Comm. Equip. Cir. Bkr.>").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

Circuit Breakers for Use in Communications Equipment (DITT)—Continued

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Circuit-breaker Accessories for Use in Communications Equipment (DITX)

USE

This category covers circuit-breaker accessories, such as manual and electrical operators, shunt trip devices, undervoltage trip devices, alarm switches and auxiliary switches, intended for field installation for use only with specific circuit-breaker types that are intended for use in communications equipment. The correct combinations of circuit breakers and accessories are indicated by markings on or with the accessory and/or the circuit breaker.

Circuit-breaker accessories that may be used in ambient temperatures other than 25°C are marked with either a maximum ambient temperature or a range of temperatures.

RELATED PRODUCTS

See Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ) and Circuit-breaker Accessories (DIHS).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers for Use in Communications Equipment (DITT), Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures," and ANSI/UL 489A, "Circuit Breakers for Use in Communications Equipment."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit-breaker Accessory for Use in Communications Equipment" (or "C.B. Acc. for Use in Comm. Equip."), "Circuit-breaker Accessory, Communications Equipment" or "Communications Equipment Circuit-breaker Accessory" (or "Comm. Equip. Cir. Bkr. Acc.").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CIRCUIT BREAKERS, MOLDED CASE AND CIRCUIT-BREAKER ENCLOSURES FOR USE IN PHOTOVOLTAIC SYSTEMS (DIUR)

GENERAL

This category covers circuit breakers and circuit-breaker enclosures intended to provide overcurrent protection and disconnecting means in dc photovoltaic (PV) systems in accordance with Article 690 of ANSI/NFPA 70, "National Electrical Code." These circuit breakers are intended for use with certified enclosures or as part of other certified equipment.

PV circuit breakers are rated up to 1000 V dc maximum and, unless otherwise marked, are not intended to be loaded to exceed 80% of the current rating.

PV circuit breakers are intended for use in ambient temperatures between -20 and 50°C.

A multi-pole PV breaker is intended for connection to individual circuits on each pole unless marked otherwise.

Circuit breakers may be mounted in any position unless marked to indicate otherwise. If, however, the circuit breaker is mounted so that the handle is operated vertically rather than rotationally or horizontally, the up position of the handle should be in the "on" position.

The interrupting rating on a circuit breaker included in a piece of equipment does not automatically qualify the equipment in which the circuit breaker is installed for use on circuits with higher available currents than the rating of the equipment itself.

PRODUCT MARKINGS

These circuit breakers are marked with the manufacturer's name and type designation, voltage rating up to 1000 V dc maximum, ampere rating, interrupting current rating at each voltage as necessary, and open/closed (on/off). Also see GENERAL above.

Circuit Breakers, Molded Case and Circuit-breaker Enclosures for Use in Photovoltaic Systems (DIUR)—Continued

If pressure-terminal connectors are not provided on a circuit breaker as shipped, the circuit breaker is marked stating which pressure-terminal connectors or component terminal kits are acceptable for use with the circuit breaker or circuit breaker-frame.

A PV circuit breaker intended only for use within a ventilated enclosure is marked with the specific certified enclosure for which it is intended, or the size of the enclosure and the location and size of the ventilation openings.

A PV circuit breaker that includes an accessory device, whether attached to the circuit breaker by the manufacturer of the circuit breaker or by others, is marked to indicate the presence of that accessory.

Where the accessory is a shunt trip device that is suitable for operation with ground-fault sensing and relaying equipment, such suitability is indicated in the marking of the circuit breaker.

These circuit breakers or circuit-breaker enclosures are marked "Photovoltaic" (or "PV") and may, in addition, be marked "Suitable for Use in Photovoltaic Systems in Accordance with Article 690 of the NEC," or equivalent.

A multi-pole PV circuit breaker or PV circuit-breaker enclosure is intended for individual circuits on each pole unless specifically marked with a diagram and/or other verbiage detailing the correct electrical connections.

PV circuit breakers are marked with the applicable wire range, wire type, and stranding if different from building wire, temperature rating of the wire, and torque ratings for the pressure-wire terminations. For the wire type, the following abbreviations are used: copper (Cu), solid (sol), stranded (str). A breaker may, instead, be marked with the minimum size bus bar with which it can be used.

PV circuit breakers are marked "50°C."

A PV circuit-breaker enclosure may be identified with an enclosure-type designation and is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

A PV circuit-breaker frame is marked with the interrupting ratings for the intended interchangeable trip units.

A PV circuit-breaker trip unit is marked with the circuit-breaker frame for which it is intended.

RELATED PRODUCTS

See Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 489B, "Outline of Investigation for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures for Use with Photovoltaic (PV) Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photovoltaic Circuit Breaker," "Enclosed Photovoltaic Circuit Breaker," "Photovoltaic Circuit-breaker Enclosure," "Photovoltaic Circuit-breaker Frame" or "Photovoltaic Circuit-breaker Trip Unit."

The word "Photovoltaic" may be abbreviated "PV"; the words "Circuit Breaker" may be abbreviated "Cir. Bkr." or "C.B."

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CIRCUIT BREAKERS, MOLDED CASE AND CIRCUIT-BREAKER ENCLOSURES (DIVQ)

USE

This category covers circuit breakers and circuit-breaker enclosures designed to provide service-entrance, feeder or branch-circuit protection in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

These circuit breakers are intended for use with certified enclosures, or as part of other certified equipment, or without enclosures where acceptable.

Investigation of a certified "replacement circuit breaker" involves only the circuit breaker and associated parts; the end application or any series combination application has not been investigated.

Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ)—Continued

Some circuit breakers are not provided with a means to prevent their installation in Class CTL assemblies. These circuit breakers are for use in old style, non-Class CTL equipment and are marked "For Replacement Use Only, Not CTL Assemblies."

Circuit breakers marked "SWD" and rated 347 V or less are suitable for switching fluorescent lighting loads on a regular basis at their rated voltage. Circuit breakers marked "HID" have been investigated for switching high-intensity-discharge lighting loads on a regular basis at their rated voltage.

Some circuit breakers include a pole intended to disconnect the grounded circuit conductor of a branch circuit. All poles of these circuit breakers open simultaneously.

Single-pole circuit breakers rated 120 V ac are suitable for use on circuits rated 120 V to ground.

Single-pole or multi-pole independent trip circuit breakers with handle ties rated 120/240 V ac, are suitable for use on multi-wire circuits with line-to-line or line-to-neutral connected loads.

2-pole independent trip breakers and single-pole breakers with handle ties, rated 120/240 V ac, are suitable for use in line-to-line single-phase circuits or line-to-line lighting and appliance branch circuits connected to 3-phase, 4-wire systems, provided the systems have a grounded neutral and the voltage to ground does not exceed 120 V.

2-pole independent trip breakers and single-pole breakers with handle ties, rated 125/250 V dc, are suitable for use in line-to-line connected 3-wire dc circuits supplied from a system with a grounded neutral where the voltage to ground does not exceed 125 V.

2-pole independent trip breakers and single-pole breakers with handle ties, rated 125/250 V (both ac and dc), are suitable for use in accordance with either of the above two paragraphs, as applicable.

Multi-pole circuit breakers without a common trip function are marked "independent trip," "no common trip" or equivalent wording.

3-pole circuit breakers having provision for two poles to be connected to a bus structure and a third isolated pole (commonly referred to as delta breakers) are marked "For Replacement Use Only."

3-pole circuit breakers are suitable for use on 3-phase systems. A 3-pole breaker used in place of a 2-pole breaker on a 3-phase system, such as a 2-pole breaker used in a branch circuit that is actually two legs of a 3-phase system, is acceptable without the 3-pole breaker being specifically marked.

Multi-pole common trip circuit breakers rated 120/240 V ac are suitable for use in a single-phase multi-wire circuit, with or without the neutral connected to the load, where the voltage to ground does not exceed 120 V.

Multi-pole common trip circuit breakers rated 125/250 V or 125/250 V dc are suitable for use in a single-phase and a dc multi-wire circuit, with or without the neutral connected to the load, where the voltage to ground does not exceed 125 V.

Circuit breakers, the performance of which may be affected by a 40°C ambient temperature within the enclosure, and that have been investigated for this application, are marked "40 C."

Unless otherwise marked, circuit breakers should not be loaded to exceed 80% of their current rating, where in normal operation the load will continue for three hours or more.

Circuit-breaker enclosures marked for service equipment use may also be used to provide the main control and means of cutoff for a separately-derived system or a second building.

Circuit-breaker enclosures identified with an enclosure type designation are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

A current-limiting circuit breaker is one that does not employ a fusible element and that when operating within its current-limiting range, limits the let-through I^2t to a value less than the I^2t of a 1/2 cycle wave of the symmetrical prospective current.

All certified circuit breakers are suitable for group motor protection in accordance with Section 430.53 of the NEC.

Some certified circuit breakers have adjustable settings and can be repeatedly field adjusted for all changeable characteristics. Adjustable circuit breakers are marked with the maximum ampere rating and either a percentage or similar markings, or with current markings for each continuous-current adjustment setting.

PRODUCT TYPES

Circuit breakers and circuit-breaker enclosures are indicated by the label designations as follows:

Circuit Breaker — without enclosure, and with noninterchangeable trip units.

CTL Circuit Breaker — has physical size, configuration or other means which, in conjunction with the physical means provided in a Class CTL assembly, is designed to prevent the installation of more circuit breaker poles than the number for which the assembly is designed and rated.

Circuit-breaker Frame — frame only of circuit breaker with provision for interchangeable trip units. A labeled circuit-breaker frame is certified for use only with a labeled circuit-breaker trip unit.

Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ)—Continued

Circuit-breaker Trip Unit — trip unit only of circuit breaker having provision for interchangeable trip units.

Circuit-breaker Enclosure — enclosure only for individual 1-, 2- or 3-pole circuit breaker or for two single-pole breakers not interconnected.

Replacement Circuit Breaker — a present design with external modifications to permit its mounting in place of obsolete designs of the same manufacturer in previously certified applications, such as panelboards, switchboards and the like, which are still in service.

INSTALLATION

Some circuit breakers include a ground-fault trip element. These ground-fault trip elements have been investigated in accordance with ANSI/UL 1053, "Ground-Fault Sensing and Relaying Equipment," and are suitable for providing ground-fault protection of equipment in accordance with Sections 215.10, 230.95 or 240.13 of the NEC.

Circuit breakers with ground-fault elements intended for use in accordance with NEC Articles 426 or 427 are covered under Circuit Breakers with Equipment Ground-fault Protection (DIYA).

Circuit breakers that include arc-fault elements intended for use in accordance with Section 210.12 of the NEC are covered under Arc-fault Circuit Interrupters, Combination Type (AWAH). Circuit breakers with arc-fault elements intended for use in those municipalities using the installation requirements of Section 210.12 of the 1999 – 2005 editions of the NEC are covered under Arc-fault Circuit Interrupters, Branch/Feeder Type (AVZQ).

Circuit breakers are tested under overload conditions at six times the rating to cover motor-circuit applications and are suitable for use as motor-circuit disconnects per Section 430.109 of the NEC.

Certified circuit breakers may be mounted in any position unless marked to indicate otherwise. If, however, the circuit breaker is mounted so that the handle is operated vertically rather than rotationally or horizontally, the up position of the handle should be in the "on" position.

Line and load markings on a circuit breaker are intended to limit connections thereto as marked.

RATINGS

Certified circuit breakers are rated 600 V or less. A circuit breaker is marked ac or dc, or both ac and dc. A symbol (–), where used, represents ac. The frequency is included if other than 60 Hz.

Circuit breakers that have an interrupting rating higher than 5000 A are marked to indicate the higher rating(s).

An interrupting rating on a circuit breaker included in a piece of equipment does not automatically qualify the equipment in which the circuit breaker is installed for use on circuits with higher available currents than the rating of the equipment itself.

Circuit-breaker enclosures that have a short-circuit current rating are marked accordingly.

PRODUCT MARKINGS

These circuit breakers are marked with the manufacturer's name and type designation, voltage rating, ampere rating, interrupting current rating at each voltage as necessary, frequency, and open/closed (on/off). Also see USE above.

These circuit breakers are marked with the applicable wire range, wire type (copper and/or aluminum, solid and/or stranded), temperature rating of the wire (60 and/or 75°C), and torque ratings for the pressure-wire terminations. For the wire type, the following abbreviations are used: copper (Cu), aluminum (Al), solid (sol), stranded (str). A breaker may, instead, be marked with the minimum size bus bar with which it can be used.

If pressure-terminal connectors are not provided on a circuit breaker as shipped, the circuit breaker is marked stating which pressure-terminal connectors or component terminal kits are acceptable for use with the circuit breaker or circuit breaker-frame.

Circuit breakers are marked "Line/Load" unless acceptable for use with the connections reversed.

A circuit breaker intended only for use within a ventilated enclosure is marked with the specific certified enclosure for which it is intended, or the size of the enclosure and the location and size of the ventilation openings.

A circuit breaker rated more than 4000 A intended only for cable connections is marked "For Cable Connection Only."

A circuit breaker marked "40°C" is suitable for use in an ambient environment of up to 40°C. This marking is optional for electronic-trip circuit breakers since they are not affected by ambient temperatures.

The fourth (neutral) pole of a 4-pole circuit breaker is marked "Protection – X% I_n," where "X" is 0, 50 or 100, which is the percentage ampacity of the fourth pole.

A circuit breaker that includes an accessory device, whether attached to the circuit breaker by the manufacturer of the circuit breaker, or by others, is marked to indicate the presence of that accessory.

Where the accessory is a shunt trip device that is suitable for operation with ground-fault sensing and relaying equipment, such suitability is indicated in the marking of the circuit breaker.

2-pole circuit breakers suitable for controlling 3-phase, corner-grounded delta circuits are marked "1 – 3" to indicate their suitability.

Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ)—Continued

Circuit-breaker enclosures that are suitable for use as service equipment are marked accordingly.

Some circuit breakers are intended to be used with uninterruptible power supplies (UPS) with two or three poles connected in series. These circuit breakers are marked with both the maximum and nominal DC voltage of the system where use is intended, a wiring diagram showing the proper connections of the poles in series, and a statement that these DC ratings are applicable only with UPS.

Current-limiting circuit breakers are marked "current limiting" and are marked either to indicate the let-through characteristics or to indicate where such information may be obtained.

Circuit breakers investigated for application aboard noncombatant and auxiliary naval ships are marked "Naval." Naval circuit breakers may also be marked "50°C."

RELATED PRODUCTS

See:

- Arc-fault Circuit Interrupters, Branch/Feeder Type (AVZQ)
- Arc-fault Circuit Interrupters, Combination Type (AWAH)
- Circuit-breaker Adapters (DHWZ)
- Circuit-breaker Accessories (DIHS)
- Circuit Breakers and Surge-protective Devices (DIMV)
- Circuit-breaker Current Limiters (DIRW)
- Circuit Breakers for Use in Communications Equipment (DITT)
- Circuit Breakers, Molded Case, Classified for Use in Specified Equipment (DIXF)
- Circuit Breakers with Equipment Ground-fault Protection (DIYA)
- Circuit Breakers, Adjustable Instantaneous Trip Type (DKPU2)
- Circuit Breakers, Series Connected (DKSY2)
- Circuit Breakers, Molded Case and Circuit-breaker Enclosures, Marine (DKTY)
- Circuit Breaker and Ground-fault Circuit Interrupters (DKUY)

Circuit breakers investigated for use in a marine environment are covered under Circuit Breakers, Molded Case and Circuit-breaker Enclosures, Marine (DKTY).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Circuit Breaker," "CTL Circuit Breaker," "Circuit Breaker Frame," "Circuit Breaker Trip Unit," "Circuit Breaker Enclosure" or "Replacement Circuit Breaker." The words "Circuit Breaker" may be abbreviated "C.B." in all of the product names permitted above (e.g., "C.B. Enclosure").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CIRCUIT BREAKERS, MOLDED CASE, CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (DIXF)

GENERAL

This category covers molded-case circuit breakers rated 15 to 60 A, 120/240 V maximum that have been investigated and found suitable for use in place of other Listed circuit breakers in specific Listed panelboards, with ratings not exceeding 225 A, 120/240 V ac, to be connected to circuits having an available system short-circuit current of 10 kA maximum. The circuit breakers are Classified for use in specified panelboards in accordance with the details described on the circuit breaker or in the publication provided therewith.

In addition, Classified molded-case circuit breakers may also be Listed with additional features such as a ground-fault trip element, ground-fault circuit interrupter, arc-fault circuit interrupter, secondary surge arrester, transient-voltage surge suppressor, and the like.

PRODUCT MARKINGS

A circuit breaker that is Classified only is marked on the side with the statement:

Circuit Breakers, Molded Case, Classified for Use in Specified Equipment (DIXF)—Continued

"Classified for use only in specified panelboards where the available short-circuit current is 10 kA, 120/240 volts ac or less. Do not use in equipment connected to circuits having an available system short-circuit current in excess of 10 kA, 120/240 volts ac. For catalog numbers (or equivalent) of specified panelboards, refer to Publication No. _____ provided with this circuit breaker. If additional information is necessary, contact [Classified circuit breaker manufacturer's name]."

A circuit breaker that is both Classified and Listed is marked on the side with the statement:

"This circuit breaker is Listed for use in circuit breaker enclosures and panelboards intended and marked for its use. This circuit breaker is Classified for use, where the available short-circuit current is 10 kA, 120/240 V ac or less, in the compatible panelboards shown in Publication No. _____ provided with this circuit breaker. When used as a Classified circuit breaker, do not use in equipment connected to circuits having an available system short-circuit current in excess of 10 kA, 120/240 V ac. If additional information is necessary, contact [Classified circuit breaker manufacturer's name]."

The referenced publication is a compatibility list which tabulates the company name, catalog number, number of poles and electrical ratings of the Classified circuit breaker, in addition to the company name and catalog number of the applicable UL Listed panelboards, and corresponding UL Listed circuit breakers in place of which the Classified circuit breaker has been investigated. The compatibility list also details the maximum permissible voltage and maximum available short circuit current of the supply system to the panelboard. The Classified circuit breaker is not suitable for the specified application if the system supply characteristics exceed the maximum values indicated in the compatibility list. One copy of the compatibility list is provided with each circuit breaker.

Circuit breakers which are both Classified and Listed have markings as above, with the addition of the Listing Mark, located on the side of the circuit breaker.

RELATED PRODUCTS

For information on markings, see Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ) and Circuit Breakers (DHJR).

For those Classified molded-case circuit breakers containing additional features, see:

- Arc-fault Circuit Interrupters, Branch/Feeder Type (AVZQ)
- Arc-fault Circuit Interrupters, Combination Type (AWAH)
- Circuit Breakers and Surge-protective Devices (DIMV)
- Circuit Breakers with Equipment Ground-fault Protection (DIYA)
- Circuit Breaker and Ground-fault Circuit Interrupters (DKUY)

ADDITIONAL INFORMATION


For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures," and ANSI/UL 67, "Panelboards."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark appears on the side of the circuit breaker and consists of the words "Underwriters Laboratories Inc. Classified Circuit Breaker" together with a control number. The words "Underwriters Laboratories Inc." may be abbreviated "Underwriters Lab. Inc." or "Und. Lab. Inc."

The following mark:  appears on the front, visible surface of the circuit breaker.

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CIRCUIT BREAKERS WITH EQUIPMENT GROUND-FAULT PROTECTION (DIYA)

USE AND INSTALLATION

This category covers combination circuit breaker and equipment ground-fault protective devices designed to serve the dual function of providing overcurrent protection, and ground-fault protection for equipment, as required by Articles 426 and 427 of ANSI/NFPA 70, "National Electrical Code" (NEC).

A circuit breaker and equipment ground-fault device is intended to be installed only on grounded alternating-current systems in accordance with the NEC.

PRODUCT CATEGORIES BY CATEGORY CODE

Circuit Breakers with Equipment Ground-fault Protection (DIYA)–Continued

- (1) These devices are intended to be installed in new or existing panelboards or the like.
- (2) The equipment ground-fault protection trip level is marked on the devices.
- (3) These devices are suitable for use on systems where the voltage does not exceed the rating on the device.
- (4) A two-wire device is not suitable for use in a multiwire branch circuit as defined in the NEC.
- (5) These devices are marked so that they can be distinguished from a circuit breaker and ground-fault circuit interrupter.
- (6) These devices may have any voltage rating that is acceptable for a circuit breaker.

RELATED PRODUCTS

See Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures," and ANSI/UL 1053, "Ground-Fault Sensing and Relaying Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Breaker with Equipment Ground Fault Protection" (or "C.B. W/EQ.GFP").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FUSED CIRCUIT BREAKERS (DIYV)

USE AND INSTALLATION

This category covers fused circuit breakers designed to provide service-entrance, feeder or branch-circuit protection in accordance with ANSI/NFPA 70, "National Electrical Code." They are rated 600 V or less.

These fused circuit breakers are intended for use with certified enclosures, or as part of other certified equipment, or without enclosures where applicable.

Fused circuit breakers include all the mechanical features of molded-case circuit breakers and, in addition, have one or more replaceable current limiters or fuses that function to increase the fault-current interrupting ability. They are intended to be used in the same manner as other circuit breakers when installed at the service and as branch-circuit protection and are intended to be mounted in certified enclosures. Fused circuit breakers are identified with respect to their performance characteristics as either Type 1 or Type 2.

Type 1 fused circuit breakers meet all performance requirements of molded-case circuit breakers. The fuse, fuses, or replaceable current limiters function only to extend the fault-current interrupting rating beyond the short-circuit test requirement applicable. Type 1 devices are limited to constructions that are designed to accommodate and coordinate with fuses or replaceable current limiters having high interrupting-capacity ratings.

Type 2 fused circuit breakers use a fuse, fuses or current limiters so coordinated that they function at currents below those specified in short-circuit test requirements. Except for this feature of short-circuit operation, Type 2 fused circuit breakers meet all requirements applicable to molded-case circuit breakers and, in addition, are required to clear circuits up to and including 25 times their amp rating, and circuits of 1000 A or less regardless of amp rating, without causing operation of the fuse, fuses or current limiters that are a part of the device. Type 2 devices are limited to constructions designed to accommodate and coordinate with fuses having high interrupting-capacity ratings.

RELATED PRODUCTS

See Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures."

UL MARK

Fused Circuit Breakers (DIYV)–Continued

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fused Circuit Breaker" or "Fused Circuit Breaker Frame."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CIRCUIT BREAKER AND GROUND-FAULT CIRCUIT INTERRUPTERS (DKUY)

USE AND INSTALLATION

This category covers combination circuit breaker and ground-fault circuit interrupter devices designed to serve the dual function of providing over-current protection, and protection against shock hazard, as required by ANSI/NFPA 70, "National Electrical Code" (NEC).

A circuit breaker and ground-fault circuit interrupter is intended to be installed only on grounded 60 Hz alternating-current systems in accordance with the NEC.

These devices are intended to be installed in new or existing service equipment, panelboards, and the like.

These devices are categorized by a lettered Class designation, such as Class A, to ensure proper coordination with certain utilization equipment, such as underwater swimming pool fixtures.

A two-wire device is not suitable for use in a multiwire branch circuit as defined in the NEC.

Some devices rated 120/240 V do not have a load neutral wire connector and are intended for use with 208 V or 240 V loads only.

RELATED PRODUCTS

See Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures," and ANSI/UL 943, "Ground-Fault Circuit-Interrupters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Breaker and Ground-fault Circuit Interrupter" (or "C.B./GFCI").

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CIRCUIT BREAKERS FOR USE IN HAZARDOUS LOCATIONS (DKAR)

This category covers circuit breakers which, unless otherwise noted, are of the manually operable, air-break type, providing automatic overcurrent protection.

These circuit breakers and circuit breaker enclosures are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings are independent of any marking on terminal conductors and are on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of Type R, or other 60°C wire, in circuits rated 100 A or less, and the use of Type RH, or other 75°C wire, for higher-amp-rated circuits.

A suitable marking is required in a circuit breaker enclosure, whether or not terminals are mounted therein, if it is intended that the breaker to be mounted therein is intended to be used with aluminum wire.

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CIRCUIT BREAKERS FOR USE IN HAZARDOUS LOCATIONS (DKAR)

any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BRANCH CIRCUIT AND SERVICE CIRCUIT BREAKERS FOR USE IN HAZARDOUS LOCATIONS (DKNZ)

USE

This category covers enclosed circuit breakers and circuit-breaker enclosures designed to provide service-entrance, feeder or branch-circuit protection in accordance with ANSI/NFPA 70, "National Electrical Code." These circuit breakers are designed to carry rated current at ambient temperatures of 40°C or less and are marked "40C."

Circuit-breaker enclosures are intended for use only with certified mechanisms specified in the enclosure markings.

RELATED PRODUCTS

See Circuit Breakers (DHJR) and Ground-fault Circuit Interrupters (DKUY).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers for Use in Hazardous Locations (DKAR) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standards used to investigate products in this category are ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures," and ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Breaker for Hazardous Locations" or "Circuit Breaker Enclosure for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CIRCUIT BREAKERS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (DKPA)

This category covers circuit breakers of the manually operable, air-break type, providing automatic overcurrent protection. ANSI/NFPA 70, "National Electrical Code," does not permit the use of aluminum field wiring conductors on increased safety "e" terminations. These circuit breakers and circuit breaker enclosures are intended for use only with copper conductors.

BRANCH CIRCUIT AND SERVICE CIRCUIT BREAKERS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (DKPN)

USE

This category covers enclosed circuit breakers and circuit-breaker enclosures designed to provide service-entrance, feeder or branch-circuit protection in accordance with ANSI/NFPA 70, "National Electrical Code." These circuit breakers are designed to carry rated current at ambient temperature of 40°C or less and are marked "40C."

These circuit breakers are open type and intended to operate within flameproof enclosures, or enclosed flameproof circuit breakers having increased safety "e" terminals for mounting within increased safety "e" enclosures or panelboards, or as part of other certified equipment having a type of protection suitable for the intended location. Increased-safety terminals are intended for termination of copper conductors only.

RELATED PRODUCTS

See Circuit Breakers (DHJR) and Ground-fault Circuit Interrupters (DKUY).

ADDITIONAL INFORMATION

CIRCUIT BREAKERS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (DKPA)

Branch Circuit and Service Circuit Breakers for Use in Zone Classified Hazardous Locations (DKPN)–Continued

For additional information, see Circuit Breakers for Use in Zone Classified Hazardous Locations (DKPA) and Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standards used to investigate products in this category are ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures," and ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Branch Circuit Breaker for Use in Hazardous Locations" or "Service Circuit Breaker for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CIRCUIT BREAKERS AND METAL-CLAD SWITCHGEAR OVER 600 VOLTS (DLAH)

GENERAL

This category covers indoor medium-voltage ac power circuit breakers rated over 600 V and the metal-clad switchgear in which they are intended to be installed. The term "indoor" does not preclude the use of these circuit breakers in outdoor enclosures, but rather defines the class of equipment. These circuit breakers are specifically intended to provide service-entrance, feeder or branch-circuit overcurrent protection, serve as a disconnecting means, or both. These devices are intended for installation in accordance with the requirements of ANSI/NFPA 70, "National Electrical Code."

CIRCUIT BREAKERS

The circuit breakers are three-pole devices of the draw-out type, are trip-free and may be air break, vacuum-type or devices employing other insulation medium.

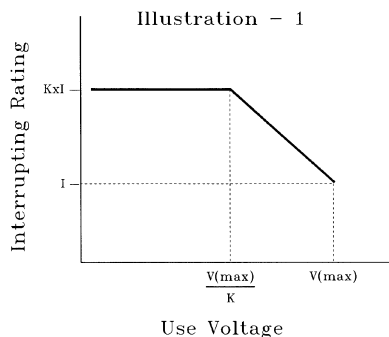
Circuit-breaker Ratings

Each circuit breaker is provided with a marking that indicates the voltage and current ratings for both the close and trip coils. This marking also contains a "close-and-latch" rating in kiloamperes that is equivalent to the momentary rating (maximum asymmetrical current rating) of the circuit breaker. This rating is expressed in rms asymmetrical amperes. Circuit breakers have a rated maximum voltage of 4.76, 8.25, 15, 27 or 38 kV with continuous current ratings of 1200, 2000 or 3000 A.

Circuit breakers are marked with an interrupting rating "I" in rms symmetrical amperes that is applicable at the maximum rated voltage. Circuit breakers using the rating structure of ANSI C37.06 (1987), "AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis – Preferred Ratings and Related Required Capabilities," are also provided with a "K" factor for determining the interrupting rating at a use voltage lower than the maximum rated voltage. The circuit breaker may interrupt a current greater than "I" by a factor up to the value of "K," at a voltage reduced from the maximum rated voltage, "V max" by the same factor, or at a

CIRCUIT BREAKERS AND METAL-CLAD SWITCHGEAR OVER 600 VOLTS (DLAH)

lower voltage, as depicted in Illustration 1. Circuit breakers using the rating structure of ANSI C37.06 (1997) or later do not have a “K” factor, or are marked with a “K” factor of 1.0.



Unless specifically marked otherwise, these circuit breakers are intended for use on three-phase circuits where the nominal voltage-to-ground is 0.58 times the line-to-line voltage.

Generator Circuit Breakers

Generator circuit breakers are rated on a symmetrical current basis and intended for installation in metal-clad switchgear between the generator and the transformer terminals. They are intended for use with generators and transformers rated between 10 and 100 MVA.

Generator circuit breakers are marked with:

- Manufacturer's name, type designation and serial number
- Year of manufacture
- Rated frequency
- Continuous current
- Maximum voltage
- Full wave impulse withstand voltage
- Short-circuit duty cycle
- Short-circuit current
- DC component (in percentage of peak value of the rated short-circuit current)
- Close, latch and carry current
- Short-time current
- Out-of-phase current
- Interruption time

METAL-CLAD SWITCHGEAR

Metal-clad switchgear may consist of one or two compartments in a vertical section. A compartment may be intended to house a circuit breaker, or it may be designated an auxiliary compartment. An auxiliary compartment may typically contain potential transformers, control gear, protective relays and the like. Vertical sections may consist of a single freestanding section or they may consist of a number of abutting vertical sections intended for interconnection by a horizontal bus. When provided with a horizontal bus, each section is marked with the ampacity of the horizontal bus in amps. Each vertical section of a line up of abutting vertical sections is provided with a “_____ of _____” marking, where the second blank indicates the total number of vertical sections provided (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark.

A section, with only horizontal bus or with no installed equipment, may be provided. This section is identified as an enclosure and is numbered as part of a line-up.

Current sensors are factory installed and may be mounted on the circuit breaker or on the line or load bus within the metal-clad switchgear. The output of these current sensors is connected to either protective relays or similar sensing and relaying equipment that is typically located on the door of the circuit-breaker compartment or in an auxiliary compartment.

Metal-clad Switchgear Ratings

Metal-clad switchgear assemblies are marked with the following ratings: maximum voltage, frequency, insulating level, continuous current, short-time current and momentary current. This marking appears on each vertical section bearing the UL Mark.

GROUND AND TEST DEVICES

A ground and test device is a switchgear accessory device that can be inserted in place of a draw-out circuit breaker for the purpose of (1) grounding the main bus and/or external circuits connected to the switchgear assembly and/or (2) primary circuit testing.

A ground and test device is marked with the manufacturer's name, a type designation, electrical ratings, primary disconnecting devices compartment compatibility and an instruction manual number.

ENCLOSURES

An enclosure investigated to determine that it is rainproof is marked “Rainproof,” “Outdoor” or “3R.” Enclosures may be either nonventilated or ventilated. Enclosures are marked to indicate the exposure category (A, B or C) for which they are intended. Enclosures marked “Category A” are intended to be installed in areas accessible to the unsupervised general pub-

CIRCUIT BREAKERS AND METAL-CLAD SWITCHGEAR OVER 600 VOLTS (DLAH)

lic; enclosures marked “Category B” are intended to be installed in areas accessible to authorized personnel only; enclosures marked “Category C” are intended to be installed in areas accessible to qualified personnel only. The environmental and exposure category marking need only appear on the first (incoming) switchgear vertical section of a line-up.

ARC-RESISTANT SWITCHGEAR

Metal-clad switchgear specially designed to provide some degree of protection to an operator, or other personnel in the vicinity of the equipment, from the effects of an internal arc occurring in atmospheric air within the enclosure when the doors and covers are secured as intended may additionally be Classified as arc-resistant switchgear.

Arc-resistant switchgear may be designed to vent overpressure gases either into the surrounding area or through an exhaust duct outside of the building.

Where overpressure gases are vented in the surrounding areas, the arc-resistant switchgear has been investigated for installation in buildings that have sufficient overhead space and minimum distance from adjacent walls to permit venting without reflecting arc products, as specified in the installation instructions provided by the manufacturer.

When provided with an exhaust duct, overhead space and minimum distance from adjacent walls are not specified. Exhaust ducts provided in the installation are intended to be as specified in the installation instructions provided by the manufacturer.

Arc-resistant switchgear is marked with an Accessibility Type designation based upon the construction and the standard to which the switchgear is investigated.

When investigated in accordance with EEMAC G14-1 (1987), “Procedure for Testing the Resistance of Metal Clad Switchgear Under Conditions of Arcing Due to an Internal Fault,” the Accessibility Types may be A, B or C.

Type A designates switchgear with arc-resistant construction at the front only.

Type B designates switchgear with arc-resistant construction at the front, sides and rear. None of these Type designations imply that the equipment maintains its intended degree of protection when operated with any door or cover, including low-voltage control or instrument compartment doors or covers open.

Type C designates switchgear with arc-resistant construction at the front, sides and rear, and between compartments within the same cell or adjacent cells. In Type C equipment, a fault in a main busbar compartment may propagate into the main busbar compartments of adjacent feeder cells.

When investigated in accordance with IEEE C37.20.7 (2001), “Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal Arcing Faults,” or IEEE C37.20.7 (2007), “Guide for Testing Metal-Enclosed Switchgear Rated Up to 38 kV for Internal Arcing Faults,” the Accessibility Types may be 1, 1B, 1C, 1D-SR, 1D-SL, 1D-R, 2, 2B or 2C.

Type 1 designates switchgear with arc-resistant construction at the front only.

Type 1B designates switchgear with arc-resistant construction at the front, and the low-voltage control or instrument compartment(s).

Types 1D-SR, 1D-SL, 1D-R designate switchgear with arc-resistant construction in the front; and at the right side (SR), left side (SL) or the rear (R), respectively.

Type 1C designates switchgear with arc-resistant construction at the front, and between compartments within the same cell or adjacent cells. In Type 1C equipment, a fault in a main busbar compartment may propagate into the main busbar compartments of adjacent feeder cells.

Type 2 designates switchgear with arc-resistant construction at the front, sides and rear.

Type 2B designates switchgear with arc-resistant construction at the front, sides, rear and the low-voltage control or instrument compartment(s).

Type 2C designates switchgear with arc-resistant construction at the front, sides and rear, and between compartments within the same cell or adjacent cells. In Type 2C equipment, a fault in a main busbar compartment may propagate into the main busbar compartments of adjacent feeder cells.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate circuit breakers and metal-clad switchgear in this category are ANSI/IEEE C37.20.2 (1999), “Metal-Clad Switchgear,” ANSI/NEMA C37.54 (2002), “Indoor Alternating Current High-Voltage Circuit Breakers Applied as Removable Elements in Metal-Enclosed Switchgear – Conformance Test Procedures,” and ANSI/NEMA C37.55 (2002), “Switchgear – Medium Voltage Metal-Clad Assemblies – Conformance Test Procedures.” Circuit breakers investigated prior to 2002 were investigated to ANSI/NEMA C37.54 (1987), “Switchgear – Indoor Alternating-Current High-Voltage Circuit Breakers Applied as Removable Elements in Metal-Enclosed Switchgear Assemblies – Conformance Test Procedures.”

CIRCUIT BREAKERS AND METAL-CLAD SWITCHGEAR OVER 600 VOLTS (DLAH)

The basic standard used to investigate ground and test devices in this category is ANSI/IEEE C37.20.6 (2007), "4.76 kV to 38 kV Rated Ground and Test Devices Used in Enclosures."

The basic standards used to investigate generator circuit breakers in this category are ANSI/IEEE C37.013 (1997), "AC High-Voltage Generator Circuit Breakers Rated on a Symmetrical Current Basis," and ANSI/IEEE C37.013A (2007), "AC High-Voltage Generator Circuit Breakers Rated on a Symmetrical Current Basis - Amendment 1: Supplement for Use with Generators Rated 10 - 100 MVA."

The basic standard used to investigate switchgear Classified as "arc resistant" is EEMAC G14-1 (1987), "Procedure for Testing the Resistance of Metal Clad Switchgear Under Conditions of Arcing Due to an Internal Fault," or IEEE C37.20.7 (2007), "Guide for Testing Metal-Enclosed Switchgear Rated Up to 38 kV for Internal Arcing Faults." Arc-resistant switchgear investigated prior to 2007 was investigated to IEEE C37.20.7 (2001), "Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal Arcing Faults." The appropriate standard used is indicated in the Classification Mark.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Medium Voltage AC Power Circuit Breaker," "Metal-clad Switchgear," "Metal-clad Switchgear Enclosure" or "Ground and Test Device."

In an assembly of products, the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark on the overall enclosure covers only the vertical section to which it is affixed; it does not cover other vertical sections included in the assembly, or the removable circuit breaker.

Classification Mark for Arc-resistant Switchgear

The Classification Mark of UL on switchgear investigated as arc resistant is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark consists of the appropriate Listing Mark noted above and the following additional information:

ARC-RESISTANT SWITCHGEAR ALSO CLASSIFIED IN ACCORDANCE WITH [standard designation and date]

The Classification Mark appears on the front of each vertical section eligible for Classification. The Classification Mark covers only the vertical section to which it is affixed; it does not cover other vertical sections included in the assembly, or the removable circuit breaker. Each vertical section of a line-up of abutting vertical sections is provided with a "____ of ____" marking, where the second blank indicates the total number of vertical sections (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CIRCUIT BREAKERS, MEDIUM VOLTAGE, CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (DLBC)

USE

This category covers circuit breakers of current design that have been modified to replace obsolete circuit breakers.

These circuit breakers are intended to be installed in switchgear where the exact replacement is no longer available.

The ratings on the circuit breaker apply unless the ratings on the host switchgear are lower. In either case the lower rating is applicable.

PRODUCT MARKINGS

In addition to other required markings, the nameplate on the circuit breaker is marked to indicate the type of switchgear for which the circuit breaker is designed, including the switchgear manufacturer and type or model number.

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers and Metal-Clad Switchgear Over 600 V (DLAH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are IEEE C37.59 (2007), "Requirements for Conversion of Power Switchgear Equipment," ANSI/IEEE C37.20.2 (1999), "Metal-Clad Switchgear," ANSI/NEMA C37.54 (2002), "For Indoor Alternating Current High-Voltage Circuit Breakers Applies as Removable Elements in Metal-

CIRCUIT BREAKERS AND METAL-CLAD SWITCHGEAR OVER 600 VOLTS (DLAH)

Circuit Breakers, Medium Voltage, Classified for Use in Specified Equipment (DLBC)–Continued

Enclosed Switchgear - Conformance Test Procedures," and ANSI/NEMA C37.55 (2002), "Switchgear - Medium Voltage Metal-Clad Assemblies - Conformance Test Procedures."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

MEDIUM VOLTAGE CIRCUIT BREAKER FOR USE ONLY IN SWITCHGEAR AS DESIGNATED ON THE NAMEPLATE

Control No.

The nameplate on the circuit breaker shall identify the switchgear for which the circuit breaker is designed, including the switchgear manufacturer and type or model number.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CIRCUIT-BREAKER SWITCHGEAR, METAL ENCLOSED, OVER 600 VOLTS (DLBK)

GENERAL

This category covers indoor medium-voltage ac power circuit breakers rated over 600 V and the metal-enclosed switchgear in which they are installed. The term "indoor" does not preclude the use of these circuit breakers in outdoor enclosures, but rather defines the class of equipment. These circuit breakers are specifically intended to provide overcurrent protection. The circuit breakers are supplemented by a series-connected switch that can ground the load circuit and serves as a disconnecting means.

This equipment is intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code."

CIRCUIT BREAKERS

The circuit breakers are three-pole devices of the stationary or drawout type, are trip-free and may be either gas insulated or vacuum-type devices.

Circuit-breaker Ratings

Each circuit breaker section is provided with a marking that indicates the voltage and current ratings. This marking also contains a "close-and-latch" rating in kiloamperes that is equivalent to the momentary rating (maximum asymmetrical current rating) of the circuit breaker. This rating is expressed in rms asymmetrical amps. Circuit breakers may be rated up to 38 kV and 3150 A.

Circuit breakers are marked with an interrupting rating "I" in rms symmetrical amps that is applicable at the maximum rated voltage. Circuit breakers using the rating structure of ANSI/IEEE C37.06 (1987), "AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis Preferred Ratings and Related Required Capabilities," are also provided with a "K" factor for determining the interrupting rating at a use voltage lower than the maximum rated voltage. When there is a marked "K" factor, the circuit breaker may interrupt a current greater than "I" by a factor up to the value of "K," at a voltage reduced from the maximum rated voltage, "V max," by the same factor, or at a lower voltage. Circuit breakers using the rating structure of ANSI/IEEE C37.06 (1995) or later do not have a "K" factor rating, or are marked with a "K" factor of 1.0.

Unless specifically marked otherwise, these circuit breakers are intended for use on three-phase circuits where the nominal voltage-to-ground is 0.58 times the line-to-line voltage.

METAL-ENCLOSED SWITCHGEAR

Metal-enclosed switchgear may consist of one or more vertical sections. Vertical sections may consist of a single freestanding section, or they may consist of a number of abutting vertical sections intended for interconnection by a horizontal bus. A vertical section may be intended to house a circuit breaker and switch or other attendant equipment, or it may be designated an auxiliary section. An auxiliary section may typically contain potential transformers, control gear, protective relays and the like. When provided with a horizontal bus, each section is marked with the ampacity of the horizontal bus in amps. Each vertical section of a line-up of abutting vertical sections is provided with a "____ of ____" marking where the second blank indicates the total number of vertical sections provided (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark.

**CIRCUIT BREAKERS AND METAL-CLAD SWITCHGEAR
OVER 600 VOLTS (DLAH)**

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**Circuit-breaker Switchgear, Metal Enclosed, Over 600 Volts
(DLBK)—Continued**

A section, with only horizontal bus or with no installed equipment, may be provided. This section is identified and is numbered as part of a line-up.

Current sensors are factory installed. The output of these current sensors is connected to either protective relays or similar sensing and relaying equipment that is typically located on the door of the section, in the front compartment of a section, or in an auxiliary compartment.

Metal-enclosed Switchgear Ratings

Metal-enclosed switchgear assemblies are marked with the following ratings: maximum voltage, frequency, insulating level, continuous current, short-time current and momentary current. This marking appears on each vertical section bearing the UL Listing Mark.

ENCLOSURES

An enclosure investigated to determine that it is rainproof is marked "Rainproof," "Outdoor" or "3R." Enclosures may be either nonventilated or ventilated. Enclosures are marked to indicate the exposure Category (A, B or C) for which they are intended. Enclosures marked "Category A" are intended to be installed in areas accessible to the unsupervised general public; enclosures marked "Category B" are intended to be installed in areas accessible to authorized personnel only; enclosures marked "Category C" are intended to be installed in areas accessible to qualified personnel only. The environmental and exposure category marking need only appear on the first (incoming) switchgear vertical section of a line-up.

ARC-RESISTANT SWITCHGEAR

Metal-enclosed switchgear specially designed to provide some degree of protection to an operator, or other personnel in the vicinity of the equipment, from the effects of an internal arc occurring in atmospheric air within the enclosure when the doors and covers are secured as intended may additionally be Classified as arc-resistant switchgear.

Arc-resistant switchgear may be designed to vent overpressure gases either into the surrounding area or through an exhaust duct outside of the building.

Where overpressure gases are vented in the surrounding areas, the arc-resistant switchgear has been investigated for installation in buildings that have sufficient overhead space and minimum distance from adjacent walls to permit venting without reflecting arc products, as specified in the installation instructions provided by the manufacturer.

When provided with an exhaust duct, overhead space and minimum distance from adjacent walls are not specified. Exhaust ducts provided in the installation are intended to be as specified in the installation instructions provided by the manufacturer.

Arc-resistant switchgear is marked with an Accessibility Type designation based upon the construction and the standard to which the switchgear is investigated.

When investigated in accordance with IEEE C37.20.7 (2001), "Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal Arcing Faults," or IEEE C37.20.7 (2007), "Guide for Testing Metal-Enclosed Switchgear Rated Up to 38 kV for Internal Arcing Faults," the Accessibility Types may be 1, 1B, 1C, 1D-SR, 1D-SL, 1D-R, 2, 2B or 2C.

Type 1 designates switchgear with arc-resistant construction at the front only.

Type 1B designates switchgear with arc-resistant construction at the front, and the low-voltage control or instrument compartment(s).

Types 1D-SR, 1D-SL, 1D-R designate switchgear with arc-resistant construction in the front; and at the right side (SR), left side (SL) or the rear (R), respectively.

Type 1C designates switchgear with arc-resistant construction at the front, and between compartments within the same cell or adjacent cells. In Type 1C equipment, a fault in a main busbar compartment may propagate into the main busbar compartments of adjacent feeder cells.

Type 2 designates switchgear with arc-resistant construction at the front, sides and rear.

Type 2B designates switchgear with arc-resistant construction at the front, sides, rear and the low-voltage control or instrument compartment(s).

Type 2C designates switchgear with arc-resistant construction at the front, sides and rear, and between compartments within the same cell or adjacent cells. In Type 2C equipment, a fault in a main busbar compartment may propagate into the main busbar compartments of adjacent feeder cells.

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers and Metal-clad Switchgear Over 600 Volts (DLAH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate circuit breakers and metal-enclosed switchgear in this category are ANSI/IEEE C37.20.3 (2001), "IEEE Standard for Metal-Enclosed Interrupter Switchgear," ANSI/NEMA C37.57

**CIRCUIT BREAKERS AND METAL-CLAD SWITCHGEAR OVER
600 VOLTS (DLAH)**
**Circuit-breaker Switchgear, Metal Enclosed, Over 600 Volts
(DLBK)—Continued**

(2003), "Metal-Enclosed Interrupter Switchgear Assemblies – Conformance Testing," and ANSI/NEMA C37.54 (2002), "Indoor Alternating-Current High-Voltage Circuit Breakers Applied as Removable Elements in Metal-Clad Switchgear Assemblies – Conformance Test Procedures."

The basic standard used to investigate switchgear Classified as "arc resistant" is IEEE C37.20.7 (2007), "Guide for Testing Metal-Enclosed Switchgear Rated Up to 38 kV for Internal Arcing Faults." Arc-resistant switchgear investigated prior to 2007 was investigated to IEEE C37.20.7 (2001), "Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal Arcing Faults." The appropriate standard used is indicated in the Classification Mark.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Metal-enclosed Circuit Breaker Switchgear."

In an assembly of products, the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark covers only the sections included in the assembly.

Classification Mark for Arc-resistant Switchgear

The Classification Mark of UL on switchgear additionally investigated as arc resistant is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark appears on the front of each vertical section eligible for Classification. The Classification Mark covers only the vertical section to which it is affixed; it does not cover other vertical sections included in the assembly, or the removable circuit breaker. Each vertical section of a line-up of abutting vertical sections is provided with a "____ of ____" marking where the second blank indicates the total number of vertical sections (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark.

The Classification Mark consists of the Listing Mark noted above and the following additional information:

**ARC-RESISTANT SWITCHGEAR
ALSO CLASSIFIED IN ACCORDANCE WITH
[standard designation and date]**

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CIRCUIT PROTECTORS (DLBX)
USE

This category covers circuit protectors designed for installation in standard Edison-base fuseholders and intended to provide overcurrent protection for services and branch circuits. Circuit protectors are not provided with manual "On" and "Off" switching means, but are provided with a trip-free manual reset to reclose the circuit after automatic opening as a result of overload or short circuit.

Circuit protectors are suitable for use on circuits where the available fault current does not exceed 5000 A rms symmetrical.

RELATED PRODUCTS

See Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Protector."

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CLASS 2 AND COMMUNICATION CABLE MANAGEMENT SYSTEMS (DLPV)

USE

This category covers cable management systems consisting of extruded channels and related fittings for the routing of Class 2 and communication circuits.

These products are not intended for applications that require the use of a raceway in accordance with ANSI/NFPA 70, "National Electrical Code." These products are not intended for use in environmental air spaces, plenums, risers or any concealed use.

PRODUCT MARKINGS

The number, type and size of cable which may be installed in the certified system is marked on the lengths of extruded channel, on the installation instruction sheet or on the package in which it is shipped. Each length of extruded channel is marked "For Class 2 Circuits Only," "For Communication Circuits Only," or equivalent wording.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 5C, "Surface Raceways and Fittings for Use with Data, Signal, and Control Circuits."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Class 2 and Communication Cable Management System."

The Listing Mark is applied to each length of extruded channel cover or base and each fitting or the smallest unit container in which the fitting is packaged.

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CLEANING MACHINES (DMDT)

This category covers household and commercial dishwashers, motor-operated cleaning machines, electrically-operated high-pressure cleaning machines, vacuum cleaning machines and blower cleaners.

Appliances such as wet-pick-up vacuum cleaners intended to employ water or other solutions with similar characteristics are provided with means for grounding or are double-insulated.

Appliances specified as double insulated are constructed with a special insulating system in lieu of grounding to comply with Sections 250.110 and 250.114 of ANSI/NFPA 70, "National Electrical Code" (NEC). Such appliances are distinctively marked "Double-Insulated" or "Double Insulation."

In cases where the nature or construction of the equipment is such that precautions beyond the requirements of the NEC must be observed in installation or use, suitable warnings are marked on the equipment.

Those cleaning machines which have been found suitable for installation outdoors, or with sections exposed outdoors, are so indicated on the equipment.

The burglary and theft protection features of the coin-operated machines have not been investigated.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CLEANING MACHINES, MOTOR OPERATED (DMGK)

USE

This category covers cleaning machines of the motor-operated type for household and commercial use. Products employing liquid cleaning agents are intended for use with water-based (nonflammable) cleaners.

REBUILT PRODUCTS

Cleaning Machines, Motor Operated (DMGK)—Continued

This category also covers motor-operated cleaning machines that are rebuilt by the original manufacturer. Rebuilt motor-operated cleaning machines are factory rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Rebuilt motor-operating cleaning machines are subject to the same requirements as new motor-operated cleaning machines.

FACTORS NOT INVESTIGATED

Any health hazards that may be associated with the use of these cleaning machines, such as removal of pathological, chemical, physical, radioactive, or other contaminating agents, have not been investigated.

RELATED PRODUCTS

This category does not cover dishwashers, high-pressure cleaning machines, vacuum cleaning machines, blower cleaners, or cleaning machines of the heating type for household and commercial use. See Dishwashers, Commercial (DMGR), Dishwashers, Household (DMIY), High-pressure Cleaning Machines, Electrically Operated (DMKK), High-pressure Cleaning Machines, Engine Driven (DNZW), Vacuum Cleaning Machines and Blower Cleaners (DMLW) and Heaters, Specialty (KSOT) for details on these types of cleaning machines.

ADDITIONAL INFORMATION

For additional information, see Cleaning Machines (DMDT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 73, "Motor Operated Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the appropriate product name as shown in the individual Listings.

For rebuilt products the word "Rebuilt," "Refurbished" or "Remanufactured" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DISHWASHERS, COMMERCIAL (DMGR)

USE AND INSTALLATION

This category covers commercial, freestanding, undercounter, and counter-insert dishwashers using water as the principal cleaning medium. Commercial dishwashers may be provided with electric heaters, natural or LP-gas equipment or low-pressure steam equipment for water heating. The water is heated in open (atmospheric pressure) tanks.

These dishwashers are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," and ANSI Z223/NFPA 54, "National Fuel Gas Code."

Commercial dishwashers are intended for use in commercial establishments, such as kitchens of restaurants, bars and hospitals, where they are not to be accessible to the public.

REBUILT PRODUCTS

This category also covers commercial dishwashers that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt commercial dishwashers are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt commercial dishwashers are subject to the same requirements as new commercial dishwashers.

RELATED PRODUCTS

For safety requirements of household dishwashers, see Household Dishwashers (DMIY).

For sanitation requirements of household dishwashers, see Residential Dishwashers (TSXU).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 921, "Commercial Electric Dishwashers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the appropriate product name as shown in the individual Listings.

Dishwashers, Commercial (DMGR)—Continued

For rebuilt products, the word “Rebuilt,” “Refurbished” or “Remanufactured” precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DISHWASHERS, HOUSEHOLD (DMIY)**USE AND INSTALLATION**

This category covers household dishwashers intended to be installed in accordance with ANSI/NFPA 70, “National Electrical Code.”

Household dishwashing machines may be of the cord-and-plug-connected or permanently connected type.

An undercounter unit may not have a complete enclosure; the unit should be installed beside kitchen cabinets, and an enclosure should be provided at installation. Such units are so marked.

Some cord-connected units are suitable for field conversion to permanently connected installation; conversion instructions are provided with the conversion parts kit.

Some permanently connected type dishwashers may be converted to cord connection by means of a cord kit that is available from the manufacturer of the dishwasher.

The performance and design of household dishwashers have been determined to comply with the current edition of ANSI/ASSE 1006, “Performance Requirements for Residential Use Dishwashers,” which covers household dishwashers connected to the potable water supply lines and discharging into the plumbing drainage system.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 749, “Household Dishwashers.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the appropriate product name as shown in the individual Listings.

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HIGH-PRESSURE CLEANING MACHINES, ELECTRICALLY OPERATED (DMKK)**GENERAL**

This category covers electrically operated, high-pressure cleaning machines in which the discharge line is hand-supported and manipulated, that use water as the cleaning agent for household and commercial use. The products may use either hot or cold water, and they may be portable, stationary or fixed. Per ANSI/NFPA 70, “National Electrical Code,” single-phase products rated 250 V ac or less are either provided with an equipment grounding conductor or terminal and a ground-fault circuit interrupter. Products rated greater than 250 V ac, or more than single phase, are provided with a permanent marking indicating the product is to be connected to a receptacle protected by a ground-fault circuit interrupter.

Products used with liquid cleaning agents are intended for water-based (nonflammable) cleaners.

FACTORS NOT INVESTIGATED

Any health hazard that may be associated with the use of these cleaning machines, such as dispersion of pathological, chemical, physical, radioactive, or other contaminating agents has not been investigated.

RELATED PRODUCTS

Fuel-engine-driven, high-pressure cleaning machines are covered under High-pressure Cleaning Machines, Engine Driven (DNZW).

Electrically operated, high-pressure cleaning machines provided with steam-cleaning features, where the steam cleaner is the appliance’s primary function, are covered under Heaters, Specialty (KSOT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

High-pressure Cleaning Machines, Electrically Operated (DMKK)—Continued

The basic standard used to investigate products in this category is ANSI/UL 1776, “High-Pressure Cleaning Machines.”

Electrically operated, high-pressure cleaning machines provided with steam-cleaning features, where the high-pressure cleaning function is the appliance’s primary function, are additionally investigated to ANSI/UL 499, “Electric Heating Appliances.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the appropriate product name as shown in the individual Listings.

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VACUUM CLEANING MACHINES AND BLOWER CLEANERS (DMLW)**GENERAL**

This category covers coin-operated vacuum cleaners and motor-operated vacuum cleaners and blower cleaners intended for household and commercial (industrial) use. Products intended for household use only are so marked. Attachments packaged with the products or indicated in the instruction manual packaged with the product are also covered under this category.

Central vacuum cleaners are intended for installation as part of a permanent central suction system in a building and investigated for remote operation.

This category also covers household vacuum cleaners provided with a steam-cleaning feature, where the vacuum cleaner is the appliance’s primary function.

This category also covers electrified wall inlet valve assemblies for use in central vacuum cleaning systems. These valve assemblies are intended for installation in accordance with Section 422.15 of ANSI/NFPA 70, “National Electrical Code.” The assemblies are shipped as a kit comprised of the mounting plate/rough-in box and cover plate. The cover plate identifies the appropriate hoses and nozzles certified for use with the valve. The assembly bears the Certification Mark.

REBUILT PRODUCTS

This category also covers vacuum cleaners that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt vacuum cleaners are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt vacuum cleaners are subject to the same requirements as new vacuum cleaners.

FACTORS NOT INVESTIGATED

Any health hazards that may be associated with the use of vacuum cleaners or combination blower and vacuum cleaners, such as dispersion of pathological, biological, chemical, physical, radioactive, or other contaminating agents have not been investigated.

RELATED PRODUCTS

Steam-cleaning machines with vacuum-cleaning features, where the steam cleaner is the appliance’s primary function, are covered under Heaters, Specialty (KSOT).

ADDITIONAL INFORMATION

For additional information, see Cleaning Machines (DMDT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1017, “Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the appropriate product name as shown in the individual Listings.

For rebuilt products the word “Rebuilt,” “Refurbished” or “Remanufactured” precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

CLEANING MACHINES (DMDT)

Vacuum Cleaning Machines and Blower Cleaners
(DMLW)—Continued

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CLEANING MACHINES FOR USE IN HAZARDOUS LOCATIONS (DMRR)

GENERAL

This category covers portable vacuum cleaners provided with special suction attachments, such as crevice tools, brushes, etc., intended to facilitate cleaning operations.

Some vacuum cleaners are designed specifically to pick up water in connection with floor-scrubbing operations; such cleaners are so indicated in the individual certifications.

Connections to supply lines require the use of receptacles with plugs, or receptacles with plugs interlocked with snap switches or their equivalent, certified for the specified hazardous locations. The flexible cord connected to the units should be frequently inspected and replaced when necessary. Terminal connections should be properly made and maintained.

Authorities Having Jurisdiction should be consulted with regard to the conditions under which these portable devices will be permitted for use. It is recognized that portable equipment should be used only when necessary.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cleaning Machine for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COAXIAL FAULT PROTECTORS FOR NETWORK-POWERED BROADBAND COMMUNICATION SYSTEMS (DUAA)

GENERAL

This category covers coaxial fault protectors intended for use with low-power, network-powered broadband communication systems. These systems are intended to be installed in accordance with Article 830 of ANSI/NFPA 70, "National Electrical Code" (NEC). The protectors are intended to be installed by the public utility company that provides the service. The protectors are intended for use with direct-buried cable systems only.

The units or systems covered in this category are designed to monitor, detect and disconnect network power on the communication cable when a fault condition exists. Network power is disconnected at the utility serving terminal or "tap" end of the direct-buried cable. The protector may only be used with low-power underground cable as described in Article 830 of the NEC.

Buried cable emerging from the ground (finished grade) is intended to be enclosed within conduit as described in Article 830 of the NEC. Those products that employ a subscriber-end module of the coaxial fault protector system are intended to have the module enclosed within a compatible network interface device (NID). The NID is provided with a means to connect conduit.

A current-limiting or extinguishing device or current-limiting or extinguishing component may be employed within the fault protector or may be a separate device or component coordinated externally with the fault protector.

INSTALLATION INSTRUCTIONS

Installation instructions are provided by the manufacturer.

PROTECTION

COAXIAL FAULT PROTECTORS FOR NETWORK-POWERED BROADBAND COMMUNICATION SYSTEMS (DUAA)

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Products covered under this category protect against the following fault conditions:

1. A short-circuit condition between the coaxial shield and center conductor, and/or
2. An open circuit in the center conductor of the coaxial cable, and/or
3. Leakage current greater than 0.5 mA between the center conductor and cable shield or ground.

RELATED PRODUCTS

See Protectors (QVGG).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2389, "Outline of Investigation for Coaxial Fault Protectors for Network-powered Broadband Communication Systems."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Coaxial Fault Protector."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COLD CATHODE TRANSFORMERS AND POWER SUPPLIES (DUEC)

USE

This category covers indoor and outdoor use cold cathode transformers and power supplies for use as part of a cold cathode electric discharge lighting system, sign, field-assembled skeletal neon sign and outline lighting system, or field-installed neon outline lighting system.

These transformers and power supplies have been investigated for the secondary-circuit ground fault protection requirements in ANSI/NFPA 70, "National Electrical Code" (NEC).

PRODUCT MARKINGS

Transformers and power supplies covered under this category are marked "Indoors," "Outdoors," "Weatherproof" or "WP." Products marked "Indoors" are only suitable for use indoors, and products marked "Outdoors" are suitable for use indoors or outdoors sheltered from rain, snow and the like by being located within a sign body, enclosure and the like. Products marked "Weatherproof" or "WP" do not need to be additionally sheltered from rain, snow and the like.

Transformers and power supplies covered under this category are marked with a Type number from 2 to 4 in association with the location designation "Indoors," "Outdoors," "Weatherproof" or "WP." These Type numbers identify particular construction features associated with a particular transformer or power supply as identified below:

Type 2 - Neon supply with input and output terminals or leads that should be enclosed in accordance with the NEC.

Type 3 - Neon supply with input terminals or leads enclosed and intended for connection to a permanent wiring system, and with output terminals or leads that should be enclosed in accordance with the NEC.

Type 4 - Neon supply with input and output terminals or leads enclosed and intended for connection to a permanent wiring system.

These Type designations do not relate in any way to general enclosure designations as noted in Electrical Equipment for Use in Ordinary Locations (AALZ).

Transformers and power supplies are also marked with a model designation and may be marked with an optional designation 2161HX, 2161KX, 2161MH or 2161WX. The optional designations provide information on the construction of the transformer and power supply for sign manufacturers and installers to use for ordering and replacement purposes.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2161, "Neon Transformers and Power Supplies."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cold Cathode Transformer" or "Cold Cathode Power Supply."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMBUSTION-DETECTION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (DUFK)

USE

This category covers electronically operated combustion detectors intended for use on gas- or oil-burning equipment.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Combustion Detection Equipment for Use in Hazardous Locations" or "Combustion Detector for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMMUNICATION, COAXIAL AND BROADBAND CABLE ASSEMBLIES (DUNH)

USE AND INSTALLATION

This category covers factory-assembled communication, coaxial and broadband cable assemblies that are comprised of certified communication, coaxial and broadband cable and cable connectors suitable for the application. They are intended for use in residential and/or commercial applications as connected premises wiring. These assemblies are intended for installation in accordance with Chapter 8 of ANSI/NFPA 70, "National Electrical Code." Restrictions that apply to the cable used in these assemblies, according to the articles in this chapter, also apply to the complete cable assemblies. The connectors employed in these assemblies have not been investigated for use under carpet.

These cable assemblies are suitable for the same applications as the certified cable with which they are constructed. For example, a cable assembly utilizing CMR, CATVR, BLR or BMR cable is suitable for use in riser applications.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1863, "Communications Circuit Assemblies," ANSI/UL 444, "Communications Cables," ANSI/UL 1655, "Community-Antenna Television Cables," and/or the requirements contained in UL Subject 2261, "Outline of Investigation for Cables for Network-Powered Broadband Communications Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Broadband Cable Assembly," "Coaxial Cable Assembly" or "Communication Cable Assembly."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or

any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMMUNICATIONS-CIRCUIT ACCESSORIES (DUXR)

GENERAL

This category covers devices intended for use in residential or commercial communications-station applications for connections to the telephone communication loop circuits. The individual certifications describe the intended location of these devices, either 1) on the equipment side or 2) outside plant side of primary protectors for communications circuits (see QVGV).

The term "equipment side" indicates that the communications-circuit accessory may only be employed on that portion of the loop circuit protected by primary protectors for communications circuits (see QVGV).

The term "outside plant," as defined in ANSI/IEEE 100-2000, "The Authoritative Dictionary of IEEE Standards Terms," is "that part of the plant extending from the line side of the main distributing frame to the line side of the station or PBX protector or connecting block, or to the line side of the main distributing frame in another office building." The "outside plant" side is not protected by a primary protector.

Accessory units may also provide features relating to the communications circuit without accessorizing the communications protector function.

Examples of accessories are RJ-type jacks and plugs, quick-connect terminal assemblies, telephone wall plates, telephone extension cords, cross-connect terminal blocks, MTU modules, terminal enclosures, network interface devices (NIDs) (excluding complex interface devices, such as fiber optic and broadband subscriber interface units), wire-guide assemblies and connector blocks.

EQUIPMENT TYPES

Equipment covered includes the following communications-circuit accessories: Modular jack and plug assemblies, quick-connect terminal assemblies, wall plates, extension cords, cross-connect terminal-block assemblies, maintenance-terminal modules, terminal enclosures, cable-splice enclosures, wire-guide assemblies and connector boxes.

INSTALLATION INSTRUCTIONS

In certain applications, communications-circuit protectors are not required because there is no exposure to accidental contact with electric light or power conductors as defined by Article 800 of ANSI/NFPA 70, "National Electrical Code." Accordingly, those products normally used only on the equipment side of a primary protector may be used without the protector. Products intended for this application are identified in the individual certifications and the installation documentation.

Communications-circuit accessories investigated for mounting in air-handling spaces are specifically identified by markings on the product and the individual certifications. Installation details are shown on the product or are provided in a separate installation document provided with the product and referenced in the marking on the product.

RELATED EQUIPMENT

Other telecommunications appliances and equipment are covered under Telephone Appliances and Equipment (WYQQ), Telephones, Cellular (WYLR) or Information Technology Equipment Including Electrical Business Equipment (NWGQ).

Modular assemblies of telecommunications equipment (e.g., racks, circuit card assemblies) that are designed for field installation by trained service personnel are covered under Custom-built Telecommunications Equipment (WYKM).

Equipment intended to be installed on the network side of the subscriber demarcation point and installed and maintained by telephone companies, CATV companies and similar network communications companies is covered under Communications Service Equipment (DUZO).

Cabinet, enclosure and rack/frame systems that are not complete information technology (IT) or telecommunications equipment, but include components and assemblies that are intended to power, protect, heat, cool or otherwise support IT or telecommunications equipment that will be installed at a later time are covered under Information Technology and Telecommunications Equipment Cabinet, Enclosure and Rack Systems (NWIN).

Power distribution centers for communications equipment are covered under Power Distribution Centers for Communications Equipment (QPQY).

Power supplies for information technology and telecommunications equipment are covered under Power Supplies, Information Technology Equipment Including Electrical Business Equipment (QQGQ) and Power Supplies, Telephone (QQJE).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1863, "Communications-Circuit Accessories."

The basic standard used to investigate nonmetallic materials of products in this category marked suitable for use in air-handling spaces is UL 2043,

"Fire Tests for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Communications-circuit Accessory" (or "Comm Ckt Acc"), or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMMUNICATIONS SERVICE EQUIPMENT (DUZO)

GENERAL

This category covers communications service equipment intended to be installed on the network side of the subscriber demarcation point, up to and including the subscriber interface unit (SIU), network interface unit (NIU), or network interface device (NID). This equipment is intended to be installed and maintained by telecommunications companies, CATV companies, and similar network telecommunications companies that provide public telecommunications, CATV, or other network services to subscriber premises. As appropriate, this equipment is intended to be installed in accordance with Articles 770, 800 and 820 of ANSI/NFPA 70, "National Electrical Code" (NEC), and the applicable sections of ANSI C2, "National Electrical Safety Code."

This equipment may or may not incorporate primary protection for communications circuits, or have provision for the installation of a Listed primary protector. This information is specified in the individual Listings for the equipment. Primary protectors are intended to suppress abnormal voltage conditions that may exist on the circuit due to accidental contact with electrical light and power conductors operating at over 300 V to ground as defined in Article 800 of the NEC. These devices may also be used to protect against electrical transients from electromagnetic disturbances or higher than normal voltages induced on the network circuits due to close proximity of the protected circuit to electric light or power conductors.

Primary protection is identified as "provided" when primary protection is built into the equipment, "compatible" when the equipment has provision for the installation of a Listed primary protector, or "none" when there are no provisions for a primary protector. Where applicable, compatible primary protector designations are either marked on the equipment or included on the individual product data sheet.

Primary protector fusing information identifies whether the primary protector is integrally "fused" (a "fused primary protector") or if a fusing wire is to be provided (a "fuseless primary protector"). Where a fusing wire is required, the maximum size fusing wire to be used in series with the equipment is indicated by the following alphabetical designations:

- A — 24 AWG copper wire with thermoplastic insulation
- B — 22 AWG copper wire with thermoplastic insulation
- C — 20 AWG, 40% copper-clad wire
- D — 26 AWG copper wire with thermoplastic insulation

Equipment intended to connect a shielded cable drop and/or incorporating a primary protector is provided with an appropriately sized grounding terminal.

Requirements for the location and installation of equipment incorporating primary protectors and provisions for cable grounding are provided in Articles 770, 800 and 820 of the NEC.

Unless marked "indoor use only," this equipment is suitable for indoor and outdoor use and provides basic protection against rain and corrosion. Equipment that provides a degree of protection against more severe environmental conditions, such as wind-blown dust and rain, icing, splashing water, immersion, etc., is marked with an enclosure type designation and provides a degree of protection as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Except for **OTHER EQUIPMENT** identified with a specific temperature range, outdoor equipment has been investigated over a temperature range of -40°C to +46°C. The effects of insolation (solar loading) have also been considered.

Where indicated by a "WARNING" marking on the interface unit, the cable drop may supply Class 3 power with a voltage up to 100 V to the interface. For such installations, the cable drop should be located, routed, or protected so that it is not exposed to touch by persons, or appropriate cable constructions or other means suitable for the installation should be provided.

INTERFACE EQUIPMENT

A subscriber interface unit (SIU), network interface unit (NIU) or network interface device (NID) is used to provide telecommunications, CATV, and other signal information to the subscriber premises and isolation between the Class 3 power on the cable drop and the subscriber premises signal circuits. An interface may incorporate two separate compartments, one compartment for network connections and components, and another compartment for the subscriber connection terminals and standard jacks.

Each individual interface Listing provides the following information: Interface designation, primary protector provisions, compatible primary protectors, fusing information and indoor or outdoor environmental use specifications.

Primary protector provisions and fusing information are marked on the interface.

TAP EQUIPMENT

A power-passing tap (PPT) or power-passing multi-tap (PPMT) is used to tap both signal and Class 3 power from the main utility network for the subscriber cable drop. This tap may be located on a utility pole, within a utility owned equipment pedestal or vault, or similar location in accordance with ANSI C2. In addition to coupling the signal circuits from the network to the cable drop, the tap limits power on the cable drop to Class 3 Levels with a maximum voltage of 100 V. Unless otherwise noted in the individual Listings, taps using communications cable for cable drops have been investigated for subscriber cable drops not exceeding 500 ft in length.

Each individual tap Listing provides the following information: Tap designation, voltage rating, power-carrying media, primary protector provisions, compatible primary protectors, fusing information and indoor or outdoor environmental use specification.

OTHER EQUIPMENT

Other equipment may contain features that are unique to a system or application. Information concerning special installation procedures, compatibility and other important design features are provided in the individual Listings, on product markings, on product data sheets and in utility installation practices.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 497, "Protectors for Paired-Conductor Communications Circuits," UL 1459, "Telephone Equipment," and UL 1950, "Information Technology Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Subscriber Interface Unit" (or "SIU"), "Network Interface Unit" (or "NIU"), "Network Interface Device" (or "NID"), "Power Passing Tap" (or "PPT"), "Power Passing Multi-Tap" (or "PPMT") or, for other equipment, "Communication Service Equipment," with or without an appropriate product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMMUNICATIONS CABLE (DUXZ)

USE AND INSTALLATION

This category covers communications cable which is a single conductor coaxial cable or a multiple conductor jacketed cable for telephone and other communications circuits for use as described in Article 800 of ANSI/NFPA 70, "National Electrical Code" (NEC).

This cable is used as wiring from a protector to a telephone or other communications equipment within a building, and for use as interconnecting wiring between parts of a communications system.

Except for special locations specifically required by the NEC, communications cable, in general, is not required to be installed in conduit or raceway.

PRODUCT MARKINGS

Communications cable is identified by marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

CM — Indicates cable intended for general use within buildings in accordance with Section 800.154(E)(1) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

CMG — Indicates cable for general use within buildings in accordance with Section 800.154(E)(1) of the NEC. The damage height of this cable does not exceed 4 ft 11 in. when tested in accordance with the CSA FT4 Vertical-Tray Flame Test in UL 1685.

CMP — Indicates cable intended for use within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 800.154(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft, when tested per ANSI/NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

CMR — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 800.154(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per ANSI/UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

CMUC — Indicates cable for undercarpet use in accordance with Section 800.154(E)(6) of the NEC. This cable complies with the VW-1 Flame Test requirements in ANSI/UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

CMX — Indicates cable intended for use within buildings (1) where the wire or cable is enclosed in raceway or noncombustible tubing, or (2) in nonconcealed spaces where the exposed length of wire or cable does not exceed 10 ft, or (3) in one- or two-family or multifamily dwellings when the cable diameter is less than 0.25 in., in accordance with Section 800.154(E) of the NEC. Type CMX cable may be marked "Outdoor" to indicate its suitability for installation outdoors on dwellings. This cable complies with the VW-1 Flame Test requirements in ANSI/UL 1581.

Cable that contains one or more optical fiber members has the suffix "-OF" added to the above.

Cable that complies with the Limited Smoke Requirements specified in UL 1685 is surface marked with the suffix "LS."

Cable marked "Shielded" contains one or more electromagnetic shields.

Cable that complies with the requirements for "Limited Combustible" specified in ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Cable marked "CI (max voltage ____)" is suitable for use as circuit-integrity cable at the maximum voltage to ground indicated, in accordance with Section 800.179(G) of the NEC.

Cable marked "CI (max voltage ____)" is intended for use in free air only.

Communications wire is a single wire or unjacketed multi-conductor assembly of these wires that is intended for use in distributing frames and in cross-connect arrays in accordance with Section 800.154(C) of the NEC. This wire or assembly is marked "cross-connect wire."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 444, "Communications Cables."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Communications Cable."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMMUNICATIONS CABLE VERIFIED IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (DVBG)

LOCAL AREA NETWORK CABLE VERIFIED FOR TRANSMISSION PERFORMANCE IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (DVBI)

GENERAL

COMMUNICATIONS CABLE VERIFIED IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (DVBG)

Local Area Network Cable Verified for Transmission Performance in Accordance with National or International Specifications (DVBI)—Continued

This category covers local area network (LAN) cable whose signal transmission characteristics have been determined to be in accordance with one of the specifications shown below or other national or international data transmission performance specifications.

Both Listed and non-Listed LAN cable can be investigated for data transmission performance.

Listed Cable — Listed cable has additionally been investigated in accordance with ANSI/UL 444, "Communications Cable" (e.g., as Type CMP, CMR, CM, CMX), and is for use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). For additional information, see Communications Cable (DUZX).

Non-Listed Cable — Non-Listed cable has not been investigated in accordance with ANSI/UL 444 and is for use where the NEC does not apply. This cable has only been investigated for data transmission performance.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS AND SURFACE-PRINT MARKINGS

Listed and Verified Cable

Listed cable employing a solid conductor that is additionally marked "Verified (UL) Category 3, 5, 5E, 6 or 6A [including latest draft number if applicable]" has been investigated in accordance with ANSI/TIA-568-C.2, "Commercial Building Telecommunications Cabling Standard — Part 2: Balanced Twisted-Pair Cabling Components." Listed cable employing a stranded conductor is marked "Verified (UL) Category 3, 5, 5E, 6 or 6A [including latest draft number if applicable] Patch Cable."

Listed cable employing a solid conductor that is additionally marked "Verified (UL) Category 5e, 6, 6A, 7 or 7A ISO/IEC 11801" has been investigated in accordance with ISO/IEC 11801, "Information Technology — Generic Cabling for Customer Premises." Cable that bears this surface mark has had the cable performance investigated to requirements as stated in IEC 61156-5, "Multi-Core and Symmetrical Pair/Quad Cables for Digital Communications — Part 5: Symmetrical Pair/Quad Cables with Transmission Characteristics up to 1,000 MHz-Horizontal Floor Wiring — Sectional Specification." Listed cable employing a stranded conductor is marked "Verified (UL) Category 5e, 6, 6A, 7 or 7A Patch Cable ISO/IEC 11801."

Listed cable employing a solid conductor that is additionally marked "Verified (UL) Category 6 or 7 NEMA WC 66" has been investigated in accordance with NEMA WC 66, "Performance Standard for Category 6 and 7 100 Ohm Shielded and Unshielded Twisted Pair Cables." Listed cable employing a stranded conductor is marked "Verified (UL) Category 6 or 7 Patch Cable NEMA WC 66."

Listed cable employing a solid conductor that is additionally marked "Verified (UL) Category 3, 5 or 5E NEMA WC 63.1" has been investigated in accordance with NEMA WC 63.1, "Performance Standard for Twisted Pair Premise Voice and Data Communications Cables." Listed cable employing a stranded conductor is marked "Verified (UL) Category 3, 5 or 5E Patch Cable NEMA WC 63.1."

Listed cable employing a solid conductor that is additionally marked "Verified (UL) Category 5, 6 or 7 BS EN 50173-1" has been investigated in accordance with BS EN 50173-1, "Information Technology — Generic Cabling Systems — Part 1: General Requirements." Cable that bears this surface mark has had the cable performance investigated to requirements as stated in BS EN 50288-1, "Multi-Element Metallic Cables Used in Analogue and Digital Communication and Control — Part 1: Generic Specification." Listed cable employing a stranded conductor is marked "Verified (UL) Category 5, 6 or 7 Patch Cable BS EN 50173-1."

Listed cable that is additionally marked "Verified (UL) in Accordance with [Specification name and/or number]" complies with the requirements of the transmission performance specification referenced in this marking.

Verified Only (Non-Listed) Cable

This cable is marked as noted below to indicate compliance to the referenced specification. The UL symbol (either the "UL in a circle symbol" or "(UL)") cannot be used in place of "Underwriters Laboratories Inc." in the statement.

Non-Listed cable employing a solid conductor and investigated to ANSI/TIA-568-C.2 is marked "Verified by Underwriters Laboratories Inc. in Accordance with Category 3, 5E, 6 or 6A ANSI/TIA-568-C.2 [including latest draft number, if applicable] Only." This print legend may be abbreviated as "Verified by Und Lab Inc. Only to ANSI/TIA-568-C.2 Cat 3, 5E, 6 or 6A." Non-Listed cable employing a stranded conductor is marked "Verified by Underwriters Laboratories Inc. in Accordance with Category 3, 5E, 6 or 6A Patch Cable ANSI/TIA-568-C.2 [including latest draft number, if applicable] Only." This print legend may be abbreviated as "Verified by Und Lab Inc. Only to ANSI/TIA-568-C.2 Cat 3, 5E, 6 or 6A Patch Cable."

Non-Listed cable employing a solid conductor and investigated to ISO/IEC 11801 is marked "Verified by Underwriters Laboratories Inc. in Accordance with Category 5e, 6, 6A, 7 or 7A ISO/IEC 11801 Only." This print legend may be abbreviated as "Verified by Und Lab Inc Only to ISO/IEC 11801"

COMMUNICATIONS CABLE VERIFIED IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (DVBG)

Local Area Network Cable Verified for Transmission Performance in Accordance with National or International Specifications (DVBI)—Continued

Category 5e, 6, 6A or 7.” Cable that bears this surface mark has had the cable performance investigated to requirements as stated in IEC 61156-5. Non-Listed cable employing a stranded conductor is marked “Verified by Underwriters Laboratories Inc. in Accordance with Category 5e, 6, 6A, 7 or 7A Patch Cable ISO/IEC 11801 Only.” This print legend may be abbreviated “Verified by Und Lab Inc Only to ISO/IEC 11801 Category 5e, 6, 6A or 7 Patch Cable.”

Non-Listed cable employing a solid conductor and investigated to NEMA WC 66 is marked “Verified by Underwriters Laboratories Inc. in Accordance with Category 6 or 7 NEMA WC 66 Only.” This print legend may be abbreviated as “Verified by Und Lab Inc Only to NEMA WC 66 Category 6 or 7.” Non-Listed cable employing a stranded conductor is marked “Verified by Underwriters Laboratories Inc. in Accordance with Category 6 or 7 Patch Cable NEMA WC 66 Only.” This print legend may be abbreviated as “Verified by Und Lab Inc Only to NEMA WC 66 Category 6 or 7 Patch Cable.”

Non-Listed cable employing a solid conductor and investigated to NEMA WC63.1 is marked “Verified by Underwriters Laboratories Inc. in Accordance with Category 3, 5 or 5E NEMA WC 63.1 Only.” This print legend may be abbreviated as “Verified by Und Lab Inc. Only to NEMA WC 63.1 Category 3, 5 or 5E.”

Non-Listed cable employing a stranded conductor is marked “Verified by Underwriters Laboratories Inc. in Accordance with Category 3, 5 or 5E Patch Cable NEMA WC 63.1 Only.” This print legend may be abbreviated as “Verified by Und Lab Inc. Only to NEMA WC 63.1 Category 3, 5 or 5E Patch Cable.”

Non-Listed cable employing a solid conductor and investigated to BS EN 50173-1 is marked “Verified by Underwriters Laboratories Inc. in Accordance with Category 5, 6 or 7 BS EN 50173-1 Only.” This print legend may be abbreviated as “Verified by Und Lab Inc. Only to BS EN 50173-1 Category 5, 6 or 7.” Cable that bears this surface mark has had the cable performance investigated to requirements as stated in BS EN 50288-1. Non-Listed cable employing a stranded conductor is marked “Verified by Underwriters Laboratories Inc. in Accordance with Category 5, 6 or 7 Patch Cable BS EN 50173-1 Only.” This print legend may be abbreviated “Verified by Und Lab Inc. Only to BS EN 50173-1 Category 5, 6 or 7 Patch Cable.”

Non-Listed cable that is marked “Verified by Underwriters Laboratories Inc. in Accordance with [Specification name and/or number and category performance number] Only” complies with the requirements of the transmission performance specification referenced in this marking. This print legend may be abbreviated as “Verified by Und Lab Inc Only to [Specification name and/or number and category performance number].”

UL MARK

Listed and Verified Cable

The required surface markings on the product as described above and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the DUZX Listing Mark and the statement “Verified in Accordance with [Specification name and/or number].”

The Listing Mark for this category requires the use of a holographic label.

Verified Only (Non-Listed) Cable

The required surface markings on the product as described above and the Verification Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “VERIFIED,” a control number, the product name “Data Transmission Cable,” and the Specification name and/or number.

The Verification Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**COMMUNITY ANTENNA TELEVISION CABLE (DVCS)
USE AND INSTALLATION**

COMMUNITY ANTENNA TELEVISION CABLE (DVCS)

This category covers community antenna television cable for use in accordance with Article 820 of ANSI/NFPA 70, “National Electrical Code” (NEC).

PRODUCT MARKINGS

Community antenna television cable is identified by marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

CATVP — Indicates cable intended for use within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 820.179(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame-spread distance of 5 ft when tested per ANSI/NFPA 262, “Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.”

CATVR — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 820.179(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per ANSI/UL 1666, “Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.”

CATV — Indicates cable intended for general use within buildings in accordance with Section 820.179(C) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in ANSI/UL 1581, “Reference Standard for Electrical Wires, Cables, and Flexible Cords.”

CATVX — Indicates cable intended for limited use within buildings (1) where the cables are enclosed in raceway or noncombustible tubing, or (2) in nonconcealed spaces where the exposed length of cable does not exceed 10 ft, or (3) installed in one- or two-family or multifamily dwellings when the cable diameter is less than 0.375 in. in accordance with Section 820.179(D) of the NEC. This cable complies with the VW-1 Flame Test requirements in ANSI/UL 1581.

Cable marked “sunlight resistant” or “sun res” may be exposed to the direct rays of the sun.

Cable marked “-30C,” “-40C,” “-50C,” “-60C” or “-70C” complies with a cold bend test conducted at that temperature.

Cable marked “direct burial,” “for direct burial” or “dir bur” has been investigated and found suitable for direct burial in the earth.

Cable that complies with the requirements for “Limited Combustible” specified in ANSI/NFPA 90A, “Installation of Air-Conditioning and Ventilating Systems,” is surface marked “Limited Combustible.”

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1655, “Community Antenna Television Cables.”

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Community Antenna Television Cable.”

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMPUTER INTERCONNECTION CABLE ASSEMBLIES (DVPJ)

USE AND INSTALLATION

This category covers computer interconnection cable assemblies intended for installation between units of electronic equipment where the cable is outside of the equipment enclosure and within the computer room as defined in Article 645 of ANSI/NFPA 70, “National Electrical Code.” These cable assemblies may also be used in an office environment where the cable is visible after installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 444, “Communications Cables,” ANSI/UL 13, “Power-Limited Circuit Cables,” or ANSI/UL 758, “Appliance Wiring Material,” and ANSI/UL 60950-21, “Information Technology Equipment Safety – Part 21.”

PRODUCT CATEGORIES BY CATEGORY CODE

COMPUTER INTERCONNECTION CABLE ASSEMBLIES

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(DVPJ)

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Computer Interconnection Cable Assembly."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CONDUCTOR TERMINATION COMPOUNDS (DVPJ)

USE

This category covers conductor termination compounds for use on splice and termination connections of aluminum, copper-clad aluminum and copper conductors where used to retard oxidation at the conductor/connector interface. These compounds do not have a deleterious effect on the conductor metal, insulation or equipment when used in accordance with the manufacturer's installation instructions.

Reference should be made to the product label located on the smallest unit container for specific instructions as to the proper use of the compound.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 546, "Outline of Investigation for Conductor Termination Compounds."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Conductor Termination Compound."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CONDUIT AND FITTINGS (DWFV)

CONDUIT AND CABLE HARDWARE (DWMU)

GENERAL

This category covers conduit straps, staples, and similar types of hardware for installation and use in wiring systems in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), and the manufacturer's installation instructions and the following information.

The mechanical strength of these products is investigated with consideration given to the intended installation. Metallic devices are also investigated for resistance to corrosion, and nonmetallic devices may be for flammability and exposure to elevated or cold temperatures.

CARTON MARKINGS

The product carton for a metallic construction of any conduit and cable hardware that is intended for use in spaces used for environmental air is marked "Suitable for use in Air-Handling Spaces in accordance with Section 300.22(B), (C) and (D) of the NEC."

The product carton for a construction made of polymeric material of any conduit and cable hardware that is intended for use in spaces used for environmental air is marked "Suitable for use in Air-Handling Spaces in accordance with Section 300.22(C) and (D) of the NEC."

The product made of polymeric material that is suitable where exposed to rain is so indicated on the device or carton. The term "Wet Location" on the device or carton indicates suitability for use where directly exposed to rain.

Products intended for use at elevated or cold temperatures (above 90°C or below -5°C) are so indicated on the device or carton. The application temperature on the device or carton indicates suitability for use at the extended temperature range.

The following, where applicable, is marked on the carton or installation instructions provided on or in the carton:

CONDUIT AND FITTINGS (DWFV)

Conduit and Cable Hardware (DWMU)—Continued

1. Types or range of thicknesses of a beam flange, drop wire or rod
2. Intended mounting orientations, if restricted (for example, vertical or horizontal)
3. Sizes and types of conduit, cable, or tubing intended to be supported for hangers, staples and straps
4. Load rating greater than for the intended applications
5. Designated assembly torque when other than intended

RELATED PRODUCTS

Cable ties are covered under Positioning Devices (ZODZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2239, "Hardware for the Support of Conduit, Tubing, and Cable."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Conduit and Cable Hardware," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CONDUIT FITTINGS (DWTT)

USE

This category covers metallic and nonmetallic conduit fittings, such as connectors, couplings, conduit bodies, short-radius conduit bodies, expansion fittings, locknuts and sealing (liquid-tight) locknuts for use in the assembly of nonmetallic and metallic wiring systems. Also covered are fittings used to provide a transition between metallic and nonmetallic wiring systems. All fittings are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), and are intended for installation and use in accordance with the following information and the limitations specified in the appropriate conduit or tubing category.

Some of these fittings are also suitable for use in certain hazardous (classified) locations where unclassified locations fittings are permitted in Articles 501, 502, 503, 505 and 506 of the NEC.

This category also includes metal bushings for use in conduit and insulating bushings for use on conduit inside boxes, gutters, etc.

The individual certifications for each connector used with nonmetallic-sheathed cable may have details about the size and number of the nonmetallic-sheathed cable it will secure.

All male threaded fittings and nipples have only been investigated for use with locknuts.

Fittings with internal female threads (e.g., hubs, conduit bodies, couplings) have only been investigated for use with threaded rigid conduit.

Conduit Bodies — Conduit bodies that are not provided with a volume marking are not intended to enclose splices, taps or devices. Conduit bodies that are provided with a volume marking are covered under Metallic Outlet Boxes (QCI) or Nonmetallic Outlet Boxes (QCMZ). Conduit bodies certified for use with specific conduit body covers and conduit body covers certified for use with specific conduit bodies are covered under Conduit Bodies and Covers Certified for Use with Specified Equipment (QCKW).

Short-radius Conduit Bodies — Short-radius conduit bodies, such as capped elbows and service-entrance elbows, are not intended to contain splices or taps and are not marked with a volume.

Insulating Bushings — Insulating bushings provided either separately or as part of a fitting are suitable for temperatures of 150°C if they are colored black or brown, and for 90°C if any other color unless specifically marked for a higher temperature.

Volume — Fittings or covers for fittings should be judged to contribute no volume other than the equivalent raceway connected to it unless specifically marked.

Sealing (Liquid-tight) Locknuts — Sealing locknuts are intended for use with threaded rigid metal conduit and intermediate metal conduit with one sealing locknut in the outside or the inside and either an ordinary locknut or sealing locknut on the inside of the enclosure for wet locations or liquid-tight applications. Sealing locknuts may also be used with certified wet location or liquid-tight fittings where so marked on the fitting carton and used on the inside of the enclosure.

Conduit Fittings (DWTT)—Continued

Reusability — Fittings have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction.

CARTON MARKINGS

Fittings for use with electrical metallic tubing (adapters), unthreaded rigid metallic, intermediate metallic conduit or threaded couplings which split to fit over the ends of threaded rigid metal or intermediate metal conduit and then are bolted in place have been tested only for use with steel conduit or tubing unless marked on the fitting or carton to indicate suitability for use with aluminum or other material.

A fitting that is taped completely (from the raceway to the box, or raceway to raceway) is concrete-tight when the product carton is marked "CONCRETE-TIGHT WHEN TAPED."

Fittings for use with flexible metal conduit have been tested only for use with the type of conduit marked on the carton. The carton may be marked "FMC" for all six types of flexible metal conduit, or may also be marked "FE," "AL," "FERW," "ALRW," "FEXRW" or "ALXRW" in any combination for any combination of the six types of flexible metal conduit.

Flexible metal conduit fittings for use with conduit less than 1/2 (16) trade size, having an end stop that does not completely encircle the end of the conduit, will have the carton marking "Armored Cable Bushing Required on Flexible Metal Conduit," or will indicate to use another type of bushing. This bushing will provide protection to the conductors as they exit the conduit into the electrical enclosure.

Threadless conduit fittings suitable for use in concrete or where exposed to the weather are identified by a marking on the carton. Aluminum fittings are not considered suitable for use in concrete or cinder fill unless protected with an asphalt paint or the equivalent.

All liquid-tight fittings are identified on the carton as "Liquid-Tight." The term "Liquid-Tight" on the carton indicates suitability for use where directly exposed to oil spray or to rain.

A liquid-tight fitting is usable in wet locations and is also rain-tight and concrete-tight.

A metallic fitting that physically cannot be connected to any type of conduit other than liquid-tight flexible metallic or nonmetallic Type B conduit can have the marking on carton in which the fitting is packed. It is marked "Liquid-Tight Flexible Nonmetallic Conduit Type B Only," "LFNC-B" or "FNMC-B."

Fittings identified with an enclosure type designation or as rain-tight or liquid-tight on the carton are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Connectors that are also suitable for use with power and control tray cable, nonmetallic-sheathed cable, service-entrance cable, or flexible nonmetallic tubing are so identified by the appropriate marking on the carton. Connectors designated "For Use With Nonmetallic Sheathed Cable" are also suitable for use with multiconductor underground feeder and branch-circuit cable where used in dry locations. Unless marked otherwise on the carton, the connectors are suitable for connection of only one cable per cable entry.

Hubs intended for use with conduit that serves as a service mast in accordance with the NEC are marked on the fitting or carton to indicate suitability for use with service-entrance equipment.

GROUNDING

All metal fittings for metal cable, conduit and tubing are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with the NEC, except as noted for flexible metal conduit fittings and liquid-tight flexible metal conduit fittings.

FITTINGS

Flexible Metal Conduit Fittings — Flexible metal conduit fittings designed for connection to the conduit by clamping around the circumference of the conduit are considered suitable for grounding for use in circuits over and under 250 V and when used in accordance with the NEC and containing conductors protected by overcurrent devices rated 20 A or less. Flexible metal conduit fittings of types other than the clamping type mentioned previously in the 3/8 through 3/4 in. trade size and containing conductors protected by overcurrent devices rated 20 A or less are considered suitable for grounding when used in accordance with the NEC. All other trade sizes that have been investigated for grounding are marked "GRND" or the equivalent.

Liquid-tight Flexible Metal Conduit Fittings — Liquid-tight flexible metal conduit fittings in the 1-1/4 in. and smaller trade sizes are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with the NEC. A straight metallic fitting for use in direct contact with earth is marked "Direct Burial."

Liquid-tight Flexible Nonmetallic Conduit Fittings — Liquid-tight flexible nonmetallic conduit fittings are marked as follows:

1. A fitting for Type A conduit only is marked "Liquid-Tight Flexible Nonmetallic Conduit Type A Only," "LFNC-A only" or "FNMC-A only."
2. A metallic fitting for Type B is marked "Liquid-Tight Flexible Nonmetallic Conduit Type B Only," "LFNC-B" or "FNMC-B."

Conduit Fittings (DWTT)—Continued

3. A nonmetallic fitting for Type B conduit only is marked "Liquid-Tight Flexible Nonmetallic Conduit Type B Only," "LFNC-B only" or "FNMC-B only."
4. A nonmetallic fitting for Type C conduit only is marked "Liquid-Tight Flexible Nonmetallic Conduit Type C Only," "LFNC-C only" or "FNMC-C only."
5. A straight nonmetallic or metallic fitting for use in direct contact with earth is marked "Direct Burial."

Nonmetallic Fittings — Nonmetallic fittings suitable for use with rigid polyvinyl chloride conduit, high-density polyethylene conduit or reinforced thermosetting resin conduit are identified by the appropriate marking on the carton. Such fittings are inherently resistant to atmospheres containing industrial corrosive agents and will also withstand vapors or mists of caustic, pickling, acids, plating baths, hydrofluoric, and chromic acids. Fittings that have been investigated for exposure to other reagents may be identified by the designation "Reagent Resistant" printed on the surface of the fittings. Such special uses are described in greater detail in the individual carton markings or instructions packed with the device. Nonmetallic fittings for use with rigid PVC conduit are suitable with wires rated 90°C or less.

PVC Conduit Fittings — All PVC conduit fittings are designed for connection to both Schedule 40 and 80 PVC conduit by the use of suitable solvent-type cement. Instructions supplied by the solvent-type-cement manufacturer describe the method of assembly and precautions to be followed.

Threadless Fittings — Threadless fittings for use with electrical metallic tubing, rigid metal conduit, intermediate metal conduit or threaded couplings which split to fit over the ends of threaded rigid metal or intermediate metal conduit and then are bolted in place are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with the NEC.

Additional Fittings — For additional certifications of conduit fittings, see:

Outlet Bushings and Fittings (QCRV)
Nonmetallic-sheathed Cable Connectors (PXJV)
Insulating Bushings (NZMT)
Rigid Ferrous Metal Conduit (DYIX)
Intermediate Ferrous Metal Conduit [for elbows] (DYBY)
Armored Cable Connectors [for connectors which may also be suitable for use with flexible cord, flexible metal conduit and metal-clad (Type MC) cable] (AWSX)

RELATED PRODUCTS

A hub having provision for attachment of a grounding conductor may additionally be covered as a grounding and bonding hub under Grounding and Bonding Equipment (KDER).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings," and ANSI/UL 651, "Schedule 40 and 80 Rigid PVC Conduit."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Conduit Fitting," "Adapter" or "Coupling," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Retrofit Fitting Kits Classified for Use with Extruded Rigid PVC Conduit (DWUC)**USE**

This category covers certified retrofit fitting kits certified for use with extruded rigid nonmetallic PVC Schedule 40 conduit. These kits are intended only for truncating conduit in concrete. They are not intended for use with conduit in open air.

The kits are provided with the tools and instructions necessary for proper installation. Separate fittings intended for use with the tools may be sold separately. The kit and installation instructions are marked "PVC Conduit Repair Fitting," or the equivalent.

ADDITIONAL INFORMATION

Retrofit Fitting Kits Classified for Use with Extruded Rigid PVC Conduit (DWUC)—Continued

For additional information, see Conduit Fittings (DWTT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 651, "Schedule 40 and 80 Rigid PVC Conduit."

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

RETROFIT FITTING KIT

FOR USE WITH RIGID NONMETALLIC PVC SCHEDULE 40 CONDUIT Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FLEXIBLE CONDUIT, LIQUID-TIGHT (DWWY)

Flexible Metal Conduit Assemblies, Liquid-tight (DXAS)

USE AND INSTALLATION

This category covers liquid-tight flexible metal conduit, in trade sizes 3/8 to 4 (metric designators 12 to 103) inclusive, for installation in accordance with Article 350 of ANSI/NFPA 70, "National Electrical Code" (NEC), for conductors in circuits of 600 V, nominal, or less. This product may also be used for installation of conductors in motor circuits, and for electric signs and outline lighting in accordance with the NEC.

Liquid-tight flexible metal conduit assemblies consist of a length of liquid-tight metal conduit terminated at each end with a permanently attached connector.

Liquid-tight flexible metal conduit assemblies are suitable for use in certain hazardous (classified) locations as permitted in the NEC.

Liquid-tight flexible metal conduit assemblies are sunlight resistant and suitable for use outdoors.

Where terminated in fittings investigated for grounding and where installed with not more than 6 ft (total length) in any ground return path, liquid-tight flexible metal conduit in the 3/8 and 1/2 (12 and 16) trade sizes is suitable for grounding where used on circuits rated 20 A or less and the 3/4, 1 and 1-1/4 (21, 27 and 35) trade sizes are suitable for grounding where used on circuits rated 60 A or less.

All male threaded fittings have only been investigated for use with lock-nuts.

The following are not considered to be suitable as a grounding means:

1. The 1-1/2 (41) and larger trade sizes.
2. The 3/8 and 1/2 (12 and 16) trade sizes where used on circuits rated higher than 20 A or where the total length in the ground return path is greater than 6 ft.
3. The 3/4, 1 and 1-1/4 (21, 27 and 35) trade sizes where used on circuits rated higher than 60 A, or where the total length in the ground return path is greater than 6 ft.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 360, "Liquid-Tight Flexible Metal Conduit," and ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Liquid-Tight Flexible Metal Conduit Assembly."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Flexible Metal Conduit, Liquid-tight (DXHR)

USE AND INSTALLATION

This category covers liquid-tight flexible metal conduit in trade sizes 3/8 to 4 (metric designators 12 to 103) inclusive, for installation in accordance with Article 350 of ANSI/NFPA 70, "National Electrical Code" (NEC). Liquid-tight flexible metal conduit is intended for use with conductors in circuits of 600 V nominal or less. This product may also be used for installation of conductors in motor circuits, and for electric signs and outline lighting in accordance with the NEC.

Liquid-tight flexible metal conduit is sunlight resistant and suitable for use outdoors.

Where terminated in fittings investigated for grounding and where installed with not more than 6 ft (total length) in any ground-return path, liquid-tight flexible metal conduit in the 3/8 and 1/2 (12 and 16) trade sizes is suitable for grounding where used on circuits rated 20 A or less, and the 3/4, 1 and 1-1/4 (21, 27 and 35) trade sizes are suitable for grounding where used on circuits rated 60 A or less. See Conduit Fittings (DWTT) with respect to fittings suitable as a grounding means.

The following are not considered to be suitable as a grounding means:

1. The 1-1/2 (41) and larger trade sizes.
2. The 3/8 and 1/2 (12 and 16) trade sizes where used on circuits rated higher than 20 A, or where the total length in the ground-return path is greater than 6 ft.
3. The 3/4, 1 and 1-1/4 (21, 27 and 35) trade sizes where used on circuits rated higher than 60 A, or where the total length in the ground-return path is greater than 6 ft.

PRODUCT MARKINGS

Liquid-tight flexible metal conduit suitable for direct burial is marked "Direct Burial," "Burial," "Dir Burial" or "Dir Bur."

Liquid-tight flexible metal conduit not marked with a temperature designation or marked "60 C" is intended for use at temperatures not in excess of 60°C (140°F).

Conduit intended for use in dry or oily locations at a temperature higher than 60°C (140°F) is marked "____ C dry, 60 C wet, 70 C oil res" (or "____ C dry, 60 C wet, 70 C oil resistant") with "80" or "105" inserted as the dry-locations temperature.

Conduit marked "80 C dry, 60 C wet, 60 C oil res" or "80 C dry, 60 C oil resistant" is intended for use at 80°C (176°F) and lower temperatures in air, and at 60°C (140°F) and lower temperatures where exposed to water, oil or coolants.

Conduit that has not been investigated for use where exposed to oil is marked "OIL-FREE ENVIRONMENTS ONLY."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 360, "Liquid-Tight Flexible Metal Conduit."

UL MARK

The Listing Mark of UL on the attached tag, the reel or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Liquid-Tight Flexible Metal Conduit."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Flexible Nonmetallic Conduit, Liquid-tight (DXOQ)

USE AND INSTALLATION

This category covers liquid-tight flexible nonmetallic conduit, in trade sizes 3/8 in. to 4 (metric designators 12 to 103) inclusive, for installation in accordance with Article 356 of ANSI/NFPA 70, "National Electrical Code" (NEC). This product may also be used for installation of conductors for electric signs and outline lighting in accordance with the NEC.

PRODUCT MARKINGS

Liquid-tight flexible nonmetallic conduit suitable for direct burial and in poured concrete is marked "Direct Burial," "Burial," "Dir Burial" or "Dir Bur."

Liquid-tight flexible nonmetallic conduit suitable for use outdoors is marked "Outdoor."

Liquid-tight flexible nonmetallic conduit is marked with the product name in conjunction with the Certification Mark and the type of construction: "A" for layered conduit, "B" for integral conduit and "C" for corrugated conduit, or with "LFNC-A" for layered conduit, "LFNC-B" for integral conduit, and "LFNC-C" for corrugated conduit.

Flexible Nonmetallic Conduit, Liquid-tight (DXOQ)—Continued

Liquid-tight flexible nonmetallic conduit not marked with a temperature designation or marked "60 C" is for use at temperatures not in excess of 60°C (140°F).

Conduit for use in dry or oily locations at a temperature higher than 60°C (140°F) is marked "___ C dry, 60 C wet, 70 C oil res" (or "___ C dry, 60 C wet, 70 C oil resistant") with "80 C" or "105 C" inserted as the dry-locations temperature.

Conduit marked "___ C dry, 60 C wet, 60 C oil res" (or "___ C dry, 60 C wet, 60 C oil resistant") is for use at a temperature of 105°C (221°F) and lower temperatures in air, and at 60°C (140°F) and lower temperatures where exposed to water, oil or coolants, with "80," "90" or "105" inserted as the dry-locations temperature.

RELATED PRODUCTS

Fittings for use with liquid-tight nonmetallic conduit are covered under Conduit Fittings (DWTI) and are suitable only for the type of conduit indicated by the marking on the fitting.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1660, "Liquid-Tight Flexible Nonmetallic Conduit."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Liquid-Tight Flexible Nonmetallic Conduit," "LFNC-A," "LFNC-B" or "LFNC-C."

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FLEXIBLE METAL CONDUIT (DXUZ)

USE

This category covers flexible aluminum and steel conduit in trade sizes 3/8 to 4 (metric designators 12 to 103) inclusive, flexible aluminum and steel conduit Type RW (reduced wall), flexible aluminum and steel conduit Type XRW (extra reduced wall) in trade sizes from 3/8 to 3 (16 to 78) inclusive, for installation in accordance with Article 348 of ANSI/NFPA 70, "National Electrical Code" (NEC). This product may also be used for installation of conductors in motor circuits, electric signs and outline lighting in accordance with the NEC.

Flexible metal conduit (steel or aluminum) should not be used underground (directly buried or in duct which is buried) or embedded in poured concrete or aggregate, or in direct contact with earth or where subjected to corrosive conditions. In addition, flexible aluminum conduit should not be installed in direct contact with masonry in damp locations.

For flexible metal conduit in 1-1/4 (35) trade size and smaller, where terminated in fittings investigated for grounding and where installed with not more than 6 ft (total length) in any ground-return path, flexible metal conduit is suitable for grounding where used on circuits rated 20 A or less. See Conduit Fittings (DWTI) with respect to fittings suitable as a grounding means.

The following are not considered to be suitable as a grounding means:

1. The 1-1/2 (41) and larger trade sizes.
2. The 1-1/4 (35) trade size and smaller where used on circuits rated higher than 20 A, or where the total length in the ground-return path is greater than 6 ft.

To prevent possible damage to flexible aluminum conduit, flexible aluminum and steel conduit Types RW and XRW, care must be exercised when installing connectors employing direct bearing set screws.

PRODUCT MARKINGS

Flexible aluminum conduit is marked at intervals of not more than one ft with the letters "AL."

Flexible aluminum conduit Type RW is marked at intervals of not more than one ft with the letters "AL" and "RW."

Flexible steel conduit Type RW is marked at intervals of not more than one ft with the letters "RW."

Flexible aluminum conduit Type XRW is marked at intervals of not more than one ft with the letters "AL" and "XRW."

Flexible steel conduit Type XRW is marked at intervals of not more than one ft with the letters "XRW."

RELATED PRODUCTS

See Conduit Fittings (DWTI) with respect to fittings suitable as a grounding means.

Flexible Metal Conduit (DXUZ)—Continued

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1, "Flexible Metal Conduit."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Flexible Aluminum Conduit," "Flexible Steel Conduit," "Flexible Aluminum Conduit Type RW," "Flexible Steel Conduit Type RW," "Flexible Aluminum Conduit Type XRW" or "Flexible Steel Conduit Type XRW."

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INTERMEDIATE FERROUS METAL CONDUIT (DYBY)

USE AND INSTALLATION

This category covers intermediate ferrous metal conduit that includes standard 10 ft. lengths of straight conduit, with a coupling, special lengths either shorter or longer, with or without a coupling for specific applications or uses, elbows, and nipples in trade sizes 1/2 to 4 (metric designators 16 to 103) inclusive, for installation in accordance with Article 342 of ANSI/NFPA 70, "National Electrical Code."

Galvanized intermediate steel conduit installed in concrete does not require supplementary corrosion protection.

Galvanized intermediate steel conduit installed in contact with soil does not generally require supplementary corrosion protection.

In the absence of specific local experience, soils producing severe corrosive effects are generally characterized by low resistivity less than 2000 ohm-centimeters.

Wherever ferrous metal conduit runs directly from concrete encasement to soil burial, severe corrosive effects are likely to occur on the metal in contact with the soil.

RELATED PRODUCTS

Fittings for use with unthreaded intermediate ferrous metal conduit are covered under Conduit Fittings (DWTI) and are suitable only for the type of conduit indicated by the marking on the carton.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1242, "Electrical Intermediate Metal Conduit - Steel."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Intermediate Metal Conduit" (or "IMC").

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RIGID FERROUS METAL CONDUIT (DYIX)

USE AND INSTALLATION

This category covers rigid ferrous metal conduit that includes standard 10 ft. lengths of straight conduit, with a coupling, special lengths either shorter or longer, with or without a coupling for specific applications or uses, elbows, and nipples in trade sizes 3/8 to 6 (metric designators 12 to 155) inclusive, for installation in accordance with Article 344 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Corrosion Protection and Coatings

Galvanized rigid steel conduit installed in concrete does not require supplementary corrosion protection.

PRODUCT CATEGORIES BY CATEGORY CODE

Rigid Ferrous Metal Conduit (DYIX)—Continued

Galvanized rigid steel conduit installed in contact with soil does not generally require supplementary corrosion protection.

In the absence of specific local experience, soils producing severe corrosive effects are generally characterized by low resistivity (less than 2000 ohm-centimeters).

Wherever ferrous metal conduit runs directly from concrete encasement to soil burial, severe corrosive effects are likely to occur on the metal in contact with the soil.

Conduit that is provided with a metallic or nonmetallic coating, or a combination of both, has been investigated for resistance to atmospheric corrosion. Nonmetallic outer coatings that are part of the required resistance to corrosion have been additionally investigated for resistance to the effects of sunlight.

Nonmetallic outer coatings of greater than 0.010-in. thickness are investigated with respect to flame propagation detrimental effects to any underlying corrosion protection, the fit of fittings and electrical continuity of the connection of conduit to fittings.

Conduit with nonmetallic coatings has not been investigated for use in ducts, plenums, or other environmental air spaces in accordance with the NEC.

Rigid metal conduit with or without a nonmetallic coating has not been investigated for severely corrosive conditions.

RELATED PRODUCTS

Fittings for use with unthreaded rigid metal conduit are covered under Conduit Fittings (DWTI) and are suitable only for the type of conduit indicated by the marking on the carton.

Other certifications for elbows are covered under Conduit Fittings (DWTI).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 6, "Electrical Rigid Metal Conduit - Steel."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrical Rigid Metal Conduit" (or "ERMC-S").

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RIGID FERROUS METAL CONDUIT WITH POLYVINYL CHLORIDE COATING VERIFIED FOR PVC ADHESION PERFORMANCE (DYJC)

SCOPE

This category covers Listed rigid ferrous metal conduit with an external coating of polyvinyl chloride (PVC) that has additionally been Verified for PVC adhesion performance.

REQUIREMENTS

The requirements used to investigate conduit covered under this category are indicated in the individual Verifications.

This conduit is Complementary Listed to Rigid Ferrous Metal Conduit (DYIX).

MARKING

The authorized marking by UL on the product is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The mark for these products includes the following:

ELECTRICAL RIGID METAL CONDUIT WITH POLYVINYL CHLORIDE (PVC) COATING VERIFIED FOR PVC ADHESION PERFORMANCE VERIFIED BY UL

DYJC

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RIGID NONFERROUS METALLIC CONDUIT (DYWV)

USE AND INSTALLATION

This category covers rigid nonferrous metal conduit that includes standard 10-ft. lengths of straight conduit, with a coupling, special lengths either shorter or longer, with or without a coupling for specific applications or uses, elbows, and nipples in trade sizes 3/8 to 6 (metric designators 12 to 155) inclusive for installation in accordance with Article 344 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Coatings

Nonmetallic outer coatings are investigated with respect to flame propagation, the fit of couplings, and electrical continuity with couplings.

Conduit with nonmetallic coatings has not been investigated for use in ducts, plenums, or other environmental air spaces in accordance with the NEC.

Aluminum conduit used in concrete, in contact with soil, or in severely corrosive conditions requires supplementary corrosion protection.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 6A, "Electrical Rigid Metal Conduit - Aluminum, Red Brass, and Stainless Steel."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrical Rigid Metal Conduit - Aluminum" (or "ERMC-A"), "Electrical Rigid Metal Conduit - Red Brass" (or "ERMC-RB") or "Electrical Rigid Metal Conduit - Stainless Steel" (or "ERMC-SS").

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REINFORCED THERMOSETTING RESIN CONDUIT (DZKT)

USE AND INSTALLATION

This category covers reinforced thermosetting resin conduit and fittings intended for installation in accordance with Article 355 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Reinforced thermosetting resin conduit is certified in trade sizes 1/2 to 6 (metric designators 16 to 155) inclusive, in IPS and ID dimensions, and in trade sizes 3/4 to 6 (metric designators 21 to 155) inclusive, in XW dimensions as marked on the product. Certification includes straight conduit, elbows and other fittings, unless otherwise noted.

Reinforced thermosetting resin conduit has been investigated for use at -40°C (-40°F) to 110°C (230°F).

Reinforced thermosetting resin conduit is designed for connection to couplings, fittings and boxes by use of a suitable epoxy-type cement or drive-on bell and spigot. Instructions supplied by the epoxy-type-cement manufacturer describe the method of assembly and precautions to be followed.

The conduit is designated "EB" (Encased Burial) or "DB" (Direct Burial), which refers to specific wall thicknesses. EB conduit is suitable for encasement in concrete. DB conduit is suitable for encasement in concrete and direct burial. Conduit marked "Below Ground" (or "BG") has been investigated for underground use only — for direct burial, with or without being encased in concrete.

Conduit marked "Above Ground" (or "AG") has been investigated for use aboveground, underground and for direct burial with or without encasement in concrete. This conduit has been investigated for concealed or exposed work where not subject to physical damage. The conduit is designated "SW" (Standard Wall) or "HW" (Heavy Wall), which refers to specific wall thicknesses.

XW-type reinforced thermosetting resin conduit, which refers to specific wall thicknesses, is certified as suitable for use where exposed to physical damage in accordance with the NEC and is suitable for use wherever IPS and ID conduit may be used. The marking "AG, XW, RTRC" identifies conduit suitable for aboveground use and use where exposed to physical damage in accordance with the NEC.

Reinforced thermosetting resin conduit, elbows and other fittings investigated for direct exposure to reagents are identified by the designation "Reagent Resistant" and are marked to indicate the specific reagents.

RELATED PRODUCTS

Reinforced Thermosetting Resin Conduit (DZKT)—Continued

For underground conduit other than reinforced thermosetting resin, see Rigid Nonmetallic Underground Conduit, Plastic (EAZX).

For aboveground conduit other than reinforced thermosetting resin, see Rigid Nonmetallic Schedule 40 and Schedule 80 PVC Conduit (DZYR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 2420, "Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings," ANSI/UL 2515, "Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings," and ANSI/UL 2515A, "Supplemental Requirements for Extra Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Reinforced Thermosetting Resin Conduit" (or "RTRC"), "Conduit Fitting," "Adapter," "Coupling," or other appropriate product name.

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RIGID NONMETALLIC CELLULAR CORE SCHEDULE 40 AND SCHEDULE 80 PVC CONDUIT (DZLR)**USE AND INSTALLATION**

This category covers rigid nonmetallic cellular core Schedule 40 and Schedule 80 PVC conduit, including straight conduit in trade sizes 1/2 to 6 (metric designators 16 to 155) inclusive, intended for installation as rigid nonmetallic raceway for conductors and cable in accordance with Article 352 of ANSI/NFPA 70, "National Electrical Code" (NEC). This conduit is intended for installation and use in accordance with the following information.

Rigid nonmetallic cellular core Schedule 40 and Schedule 80 PVC conduit is suitable for aboveground use indoors or outdoors exposed to sunlight and weather where not subject to physical damage, and for underground use by direct burial or encasement in concrete. Schedule 40 conduit marked "Underground Use Only" is only suitable for underground applications.

Schedule 80 conduit has a reduced cross-sectional area available for wiring space and is suitable for use wherever Schedule 40 conduit may be used. The marking "Schedule 80 PVC" identifies conduit suitable for use where exposed to physical damage and for installation on poles in accordance with the NEC.

Unless marked for higher temperatures, rigid nonmetallic cellular core PVC conduit is intended for use with conductors and cable rated 75°C or less, including where it is encased in concrete within buildings and where ambient temperature is 50°C or less. Where encased in concrete in trenches outside of buildings, it is suitable for use with conductors and cable rated 90°C or less.

Certified rigid nonmetallic cellular core PVC conduit is inherently resistant to atmosphere containing common industrial corrosive agents and will also withstand vapors or mist of caustic, pickling acids, plating bath and hydrofluoric and chromic acids.

Rigid nonmetallic cellular core PVC conduit (including couplings) that has been investigated for direct exposure to other reagents may be identified by the designation "Reagent Resistant" printed on the surface of the product. Such special uses are described as follows: Where exposed to the following reagents at 60°C or less: Acetic, Nitric (25°C only) acids in concentrations not exceeding 1/2 normal; hydrochloric acid in concentrations not exceeding 30%; sulfuric acid in concentrations not exceeding 10 normal; sulfuric acid in concentrations not exceeding 80% (25°C only); concentrated or dilute ammonium hydroxide; sodium hydroxide solutions in concentrations not exceeding 50%; saturated or dilute sodium chloride solution; cottonseed oil, or ASTM 3 petroleum oil.

Rigid nonmetallic cellular core PVC conduit is designed for connection to couplings, fittings and boxes by the use of a suitable solvent-type cement. Instructions supplied by the solvent-type cement manufacturer describe the method of assembly and precautions to be followed.

RELATED PRODUCTS

For additional certifications of rigid nonmetallic conduit suitable for underground use, see Reinforced Thermosetting Resin Conduit (DZKT),

Rigid Nonmetallic Cellular Core Schedule 40 and Schedule 80 PVC Conduit (DZLR)—Continued

Rigid Nonmetallic PVC Conduit (DZYR) and Rigid Nonmetallic High-density-polyethylene Underground Conduit (EAZX).

Fittings for rigid nonmetallic cellular core conduit are covered under Conduit Fittings (DWTT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 651, "Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Rigid Nonmetallic Cellular Core Conduit Aboveground and Underground (Schedule 40)" or "Rigid Nonmetallic Cellular Core Conduit Aboveground and Underground (Schedule 80)."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RIGID NONMETALLIC PVC CONDUIT (DZYR)**USE AND INSTALLATION**

This category covers rigid nonmetallic PVC conduit including straight conduit and elbows in trade sizes 1/2 to 6 (metric designators 16 to 155) inclusive, intended for installation as rigid nonmetallic raceway for wire and cable in accordance with Article 352 of ANSI/NFPA 70, "National Electrical Code" (NEC). This conduit may be Schedule 40, Schedule 80, Type A or Type EB. This conduit is intended for installation and use in accordance with the following information.

Schedule 40 conduit is suitable for underground use by direct burial or encasement in concrete. Schedule 40 conduit marked "Directional Boring" (or "Dir. Boring") is suitable for underground directional boring applications. Schedule 40 conduit is also suitable for aboveground use indoors or outdoors exposed to sunlight and weather where not subject to physical damage. Schedule 40 conduit marked "Underground Use Only" is only suitable for underground applications.

Schedule 80 conduit has a reduced cross-sectional area available for wiring space and is suitable for use wherever Schedule 40 conduit may be used. The marking "Schedule 80 PVC" identifies conduit suitable for use where exposed to physical damage and for installation on poles in accordance with the NEC.

Type A, Type EB and Schedule 40 conduit is intended for underground use under the following conditions, as indicated in the Certification Mark:

Type A – Installed with its entire length in concrete in any underground location.

Type EB – Installed with its entire length in concrete in trenches outside of buildings.

Schedule 40 – Direct burial with or without being encased in concrete.

Where conduit emerges from underground installation, the wiring method is intended to be of a type recognized by the NEC for the purpose.

Unless marked for higher temperature, rigid nonmetallic PVC conduit is intended for use with wire rated 75°C or less including where it is encased in concrete within buildings and where ambient temperature is 50°C or less. Where encased in concrete in trenches outside of buildings it is suitable for use with wires rated 90°C or less.

Certified PVC conduit is inherently resistant to atmosphere containing common industrial corrosive agents and will also withstand vapors or mist of caustic, pickling acids, plating bath and hydrofluoric and chromic acids.

PVC conduit and elbows (including couplings) that have been investigated for direct exposure to other reagents may be identified by the designation "Reagent Resistant" printed on the surface of the product. Such special uses are described as follows: Where exposed to the following reagents at 60°C or less: Acetic, Nitric (25°C only) acids in concentrations not exceeding 1/2 normal; hydrochloric acid in concentrations not exceeding 30%; sulfuric acid in concentrations not exceeding 10 normal; sulfuric acid in concentrations not exceeding 80% (25°C only); concentrated or dilute ammonium hydroxide; sodium hydroxide solutions in concentra-

Rigid Nonmetallic PVC Conduit (DZXR)—Continued

tions not exceeding 50%; saturated or dilute sodium chloride solution; cottonseed oil, or ASTM 3 petroleum oil.

Schedule 40, 80 Type EB and Type A PVC conduit is designed for connection to all PVC couplings, fittings and boxes by the use of a suitable solvent-type cement. Instructions supplied by the solvent-type-cement manufacturer describe the method of assembly and precautions to be followed.

Elbows of material other than PVC are provided with PVC couplings to be solvent-cemented to PVC conduit.

RELATED PRODUCTS

Additional certifications of rigid nonmetallic conduit suitable for underground use are covered under Reinforced Thermosetting Resin Conduit (DZKT) and Rigid Nonmetallic High-density-polyethylene Underground Conduit (EAXX).

Fittings for rigid nonmetallic conduit are covered under Conduit Fittings (DWTI).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 651, "Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Rigid Nonmetallic Conduit Aboveground and Underground (Schedule 40)," "Rigid Nonmetallic Conduit Aboveground and Underground Extra Heavy Wall (Schedule 80)," "Rigid Nonmetallic Conduit Underground (Polyvinyl Chloride, Schedule 40)," "Rigid Nonmetallic Conduit Underground for Concrete Encasement Only (Type A)" or "Rigid Nonmetallic Conduit Underground for Concrete Encasement in Outdoor Trenches Only (Type EB)."

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RIGID NONMETALLIC HIGH-DENSITY-POLYETHYLENE UNDERGROUND CONDUIT (EAXX)**USE AND INSTALLATION**

This category covers plastic types of rigid nonmetallic high-density-polyethylene (HDPE) conduit, including straight conduit, elbows and other bends, in sizes 1/2 to 6 (metric designators 16 to 155) inclusive, intended for installation underground as raceway for wire and cable in accordance with Article 353 of ANSI/NFPA 70, "National Electrical Code" (NEC). This conduit may be HDPE Schedule 40, Schedule 80, EPEC A, or EPEC B. This conduit is intended for installation and use in accordance with the following information.

The conduit is intended for underground use under the following condition, as indicated in the Certification Mark: Direct burial with or without being encased in concrete (HDPE Schedule 40, Schedule 80, EPEC A, EPEC B). The conduit is intended for use in ambient temperatures of 50°C or less.

Unless marked otherwise, HDPE conduit is intended for use with wire rated 75°C or less, or when directly buried or encased in concrete in trenches outside of buildings, it may be used with wire rated 90°C or less.

Where conduit emerges from underground installation, the wiring method is intended to be of a type recognized by the NEC for the purpose.

HDPE conduit is designed for joining by threaded couplings, drive-on couplings, or a butt-fusing process. Instructions supplied by the solvent-type cement manufacturer describe the method of assembly and precautions to be followed.

RELATED PRODUCTS

For additional certifications of rigid nonmetallic conduit for underground use, see Reinforced Thermosetting Resin Conduit (DZKT) and Rigid Nonmetallic PVC Conduit (DZXR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 651A, "Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit."

Rigid Nonmetallic High-density-polyethylene Underground Conduit (EAXX)—Continued

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Rigid Nonmetallic Conduit Underground High-density Polyethylene," "Rigid Nonmetallic Conduit Underground Schedule 40," "Rigid Nonmetallic Conduit Underground Schedule 80," "Rigid Nonmetallic Conduit Underground EPEC A" or "Rigid Nonmetallic Conduit Underground EPEC B."

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CONDUIT FITTINGS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (EBMB)**GENERAL**

This category covers the following types of fittings:

Conduit fittings for draining or venting are intended for mounting in existing conduit openings of conduit boxes and electrical devices. Fittings for draining or venting that do not mount in existing conduit openings, such as those with threads smaller than 1/2 in. trade size, are covered under UL's Component Recognition Program.

Conduit unions are intended for use in threaded rigid conduit wire raceways.

Conduit unions, 90-degree box-connector type are intended for use at threaded openings of devices in accordance with requirements of ANSI/NFPA 70, "National Electrical Code" (NEC).

Conduit unions, universal-type box connector are intended for use at threaded openings of devices in accordance with requirements of the NEC and may be assembled at angle greater than 90 degrees.

Flexible connection fittings are substantial fittings having an insulated inner wall and flexible-metal outer wall encased in metal braid. They are intended for use where it is necessary to employ flexible connections in threaded rigid conduit systems. Information on the minimum inside radius of bend for which these fittings have been investigated is provided with the fitting.

Authorities Having Jurisdiction should be consulted as to what conditions these flexible connection fittings will be accepted. The use of flexible fittings should be avoided whenever possible. They should be used only when conditions are such that threaded rigid conduit cannot be used.

Conduit elbows and short-radius capped elbows are intended for use where it is desirable to have a 90-degree bend and where wires may be guided when being pulled through the conduit line.

Cord connectors are intended for use in making connections between threaded rigid metal conduit systems or hazardous (classified) location devices and extra-hard-service-type flexible cord, having a grounding conductor, for portable equipment.

Fittings that are rain-tight or concrete-tight are so marked, or this information is provided with the fitting.

Cast-aluminum-alloy conduit fittings covered under this category are not considered acceptable for installation in concrete or cinder block, unless protected with asphalt-base paint or the equivalent.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product, or the Listing Mark on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Conduit Fitting for Hazardous Locations," or other appropriate product name as shown in the individual Listings.

CONDUIT FITTINGS FOR USE IN ZONE CLASSIFIED
HAZARDOUS LOCATIONS (EBMB)

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**CONDUIT FITTINGS FOR USE IN
HAZARDOUS LOCATIONS (EBNV)**

GENERAL

This category covers the following types of fittings:

Conduit fittings for draining or venting are intended for mounting in existing conduit openings of conduit boxes and electrical devices. Fittings for draining or venting that do not mount in existing conduit openings, such as those with threads smaller than 1/2-in. trade size, are covered under UL's Component Recognition Program. Only drain fittings with shutoff valves should be installed in oil-immersed devices and only where there is close supervision so that the fittings will not be left open to permit loss of oil.

Conduit fittings for sealing are intended for use only with sealing compounds specified by the manufacturer in instructions furnished with the fitting. These devices are intended for use in sealing conductors in conduit lines. No splices of conductors should be made in the fittings. Instructions with the fitting indicate any restriction on position or location of the sealing fittings. The maximum number and size of conductors that may be installed within the sealing fitting are stated in the manufacturer's installation instructions provided with each fitting.

Conduit unions are intended for use in threaded rigid conduit wire raceways.

90-degree box connector-type conduit unions are intended for use at threaded openings of devices in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

Universal-type box connector conduit unions are intended for use at threaded openings of devices in accordance with the NEC and may be assembled at an angle greater than 90 degrees.

Flexible connection fittings are substantial fittings having an insulated inner wall and a flexible metal outer wall encased in a metal braid. They are intended for use where it is necessary to employ flexible connections in threaded rigid conduit systems. Information on the minimum inside radius of bend for which these fittings have been investigated is provided with the fitting.

Prospective users should first ascertain from Authorities Having Jurisdiction under what conditions these flexible connection fittings will be accepted. The use of flexible fittings should be avoided whenever possible. They should be used only when conditions are such that threaded rigid conduit cannot be used.

Conduit elbows and short-radius capped elbows are intended for use where it is desirable to have a 90-degree bend and where wires may be guided when being pulled through the conduit line.

Cord connectors are intended for use in making connections between threaded rigid metal conduit systems or hazardous location devices and extra hard service type flexible cord, having a grounding conductor, for portable equipment.

Fittings that are rain-tight or concrete-tight are so marked, or this information is provided with the fitting.

Cast-aluminum alloy conduit fittings covered under this category are not considered acceptable for installation in concrete or cinder fill, unless protected with asphalt base paint or the equivalent.

RELATED PRODUCTS

See Outlet Boxes for Use in Hazardous Locations (QBCR).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product, or the Listing Mark on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Conduit Fitting for Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufac-

CONDUIT FITTINGS FOR USE IN HAZARDOUS LOCATIONS
(EBNV)

turer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**CONNECTORS, SPECIAL PURPOSE
(ECIS)**

GENERAL

This category covers connector systems employing nonstandard blade, slot and/or pin configurations that are intended for use in special-purpose applications in wiring systems recognized by ANSI/NFPA 70, "National Electrical Code" (NEC), or in highway lighting, utility company installations, and similar uses not within the scope of the NEC. These devices may incorporate switches or overcurrent protection. The connector systems may include the following types of products:

Equipment, Power or Female Outlet — A female contact device for mounting in or on utilization equipment.

Receptacle — A female contact device intended to be installed in or on a wiring system to supply current to utilization equipment.

Plug — A male contact device for connection and disconnection of a flexible cord or cable to a receptacle, cord connector, or other female outlet device.

Cord Connector — A female contact device to be wired on flexible cord for use as an extension from an outlet to make a detachable electrical connection for an attachment plug or, as an appliance coupler to a male inlet.

Equipment, Power or Male Inlet — A male contact device to be mounted in or on utilization equipment to provide a detachable electrical connection to an appliance coupler or cord connector.

Breakaway Connector — A connector that is not intended for routine disconnection under load, but which is intended to separate from its mating half when subjected to an impact force in an emergency situation.

Hybrid Connector — A connector employing two or more dedicated constructions of blades, pins or contacts that are intended to perform different functions, such as handling power, signal currents, or fiber optic transmissions.

TERMINALS

The termination of devices intended to be wired to flexible cord is based on the use of flexible cord or cable having copper conductors, in accordance with Article 400 of the NEC. The ampacity of the flexible cord and cable is based on Section 400.5, Tables 400.5(A) and 400.5(B). Product markings or the manufacturer's instructions provided with the device indicate the conductor size(s) to be used. Unless stated otherwise in the individual certifications, the terminations are based on the use of 60°C flexible cord or cable.

Unless stated otherwise in the individual certifications, the termination provisions of all devices for fixed wiring installations are based on use of conductors having temperature ratings marked on the product at their ampacities specified in Table 310.16 of the NEC. These temperature ratings may be represented by a 7 or 9 associated with the marking "CU," "AL" or "AL-CU," e.g., "AL9," "AL9CU," "AL7CU," "CU7," "CU9."

Terminals not marked "AL-CU" are intended for use with copper conductors only. Terminals marked "AL-CU" are intended for use with aluminum, copper and copper-clad aluminum conductors.

RATINGS

These devices are rated 600 V or less, ac or dc, and 200 A or less. They may also be rated in wattage or in horsepower as noted in the individual certifications.

The devices are tested on circuits involving full rated potential to ground, except for multi-phase rated devices which are tested on circuits consistent with their voltage ratings, for example, a 120/208 V, 3-phase, device is tested on a circuit involving 120 V to ground.

GROUNDING

Devices having a terminal identified by a green colored finish, the words "green" or "ground," the letters "G" or "GR," or the "inverted-Christmas-tree" grounding symbol are grounding types. The blade, pin or contact member connected to this terminal is for equipment grounding only.

APPLICATION

Each individual connector certification may contain features that are unique to a system or application. Information concerning special installation procedures, compatibility and other important design features are provided in the individual certifications, on product markings, on product data sheets and/or in installation instructions. The individual certifications contain the following information:

Maximum Use Temperature — Assigned to the connector systems based upon the temperature rating of the insulation of the intended conductors or the insulating materials used in the connectors, whichever is less.

Installation — Indicates whether the connectors are intended for use on flexible cord or as a part of a fixed wiring system. Specifies whether the connectors are intended for use within an overall enclosure, within locations where they will be concealed (not readily accessible) after on-site interconnection of modules or building components, or where they will be

PRODUCT CATEGORIES BY CATEGORY CODE

exposed. Connectors intended for exposed or concealed installation are investigated for electrical insulation, mechanical strength, temperature rise, fault-current withstand, and effectiveness of grounding path to demonstrate equivalency to the wiring system on which they are intended to be installed.

Other Conditions — Describes other conditions of use for which the connector system has been investigated, including, but not limited to, environmental factors and enclosure type designations.

RELATED PRODUCTS

This category does not cover devices to be molded on flexible cord or wire, or unassembled devices to be factory assembled on flexible cord or wire. Such devices are complete only after installation of the flexible cord or wire and are investigated as part of a complete assembly.

This category does not cover general-purpose devices; see Attachment Plugs (AXGV) and Receptacles (RTDV).

This category does not cover pin-and-sleeve-type devices; see Pin-and-Sleeve-type Plugs, Receptacles and Cable Connectors (QLGD).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 20, "General-Use Snap Switches," ANSI/UL 486A-486B, "Wire Connectors," ANSI/UL 486C, "Splicing Wire Connectors," ANSI/UL 486D, "Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations," ANSI/UL 486E, "Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors," ANSI/UL 498, "Attachment Plugs and Receptacles," ANSI/UL 1682, "Plugs, Receptacles, and Cable Connectors, of the Pin-and-Sleeve Type," and other related wiring-device standards as appropriate.

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Special Purpose Connector," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CONTAINMENT PRODUCTS FOR FLAMMABLE AND COMBUSTIBLE LIQUIDS (ECPR)

This category covers various types of containment products, assemblies, accessories and components intended for the storage or transfer of flammable and/or combustible liquids with wide variations identified in the individual product categories, such as:

- nominal liquid capacity (up to approximately 75,000 gal or 284,000 L)
- types (cans, containers, tanks, portable, stationary, fixed, nonreusable, etc.)
- special types or ratings (fire rated, process, vault, cabinet, etc.)
- general liquids (general flammables and/or combustibles, or motor vehicle fuels)
- specific liquids (specific flammables or combustibles as identified in the individual Listings)
- locations (indoor, outdoor, underground, aboveground, vault)
- uses (consumer, residential, commercial or industrial)
- materials (metallic, nonmetallic, composite)

Containment products for flammable and combustible liquids are divided into common groups with respect to some of the variations above:

Portable Tanks, Containers and Cans (ECTX) — Covers metallic and non-metallic portable tanks, containers and cans, typically of smaller size and intended for the short-term storage and transport of fuels, chemicals, or similar flammable and/or combustible liquids.

Fixed and Stationary Storage Tanks (EDQX) — Covers metallic, nonmetallic and composite, fixed and stationary storage tanks, typically of larger size and intended for the long-term storage of fuels or similar flammable and/or combustible liquids at atmospheric pressure.

Transfer Pipe, Containment Sumps and Pipe/Sump Accessories (QLVW) — Covers transfer pipe and containment sumps typically intended for use in fuel-dispensing systems, and various pipe/sump accessories and components intended for use in the assembly of these systems.

Miscellaneous Tanks, Storage Products and Tank Accessories (WWXR) — Covers miscellaneous tanks and storage products intended for specific-use applications, and various tank accessories and components intended for use in or on completed containment products.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FIXED AND STATIONARY STORAGE TANKS (EDQX)

This category covers metallic, nonmetallic and composite, fixed and stationary storage tanks, typically of larger size and intended for the long-term storage of fuels or similar flammable and/or combustible liquids at atmospheric pressure. These tanks are not intended to be moved with regular frequency (stationary), or are buried, or connected to structures or piping (fixed).

Underground tanks are fixed-type vessels constructed from metallics, non-metallics or composites and are intended for direct-burial applications. Underground tanks may also include integral upgrade systems or lining/coating systems for specific fuels.

Aboveground tanks are stationary or fixed-type vessels constructed from metallics and are intended for above-grade applications. Aboveground tanks may also include limited mechanical accessories or special uses.

Below-grade vaults are fixed-type compartments constructed from nonmetallics and intended for the watertight, below-grade storage of aboveground tanks with provisions for access, venting monitoring and optional secondary containment.

Fire-rated tanks are stationary or fixed-type aboveground or underground tanks provided with structural support and thermal insulation intended for the physical and fire protection of the core tank, supports and stored liquid.

This category does not cover portable tanks intended for the commercial transport of liquid commodities by truck, rail or ship (as defined by Chapter 6.2 of ANSI/NFPA 30, "Flammable and Combustible Liquids Code," in accordance with 49CFR, Subchapter C, "USDOT Hazardous Materials Regulations," or the "UN Recommendations on the Transport of Dangerous Goods," Part 6, "Requirements for the Construction and Testing of Packagings, Intermediate Bulk Containers (IBCs), Large Packagings and Portable Tanks").

This category does not cover aboveground flammable liquid tank systems (fuelers) that include a base tank with integral pressure or vacuum pump, liquid-level device, leak-monitoring device, hose, nozzle or other dispensing equipment.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Underground Tanks (EGHX)

GENERAL

This category covers shop-fabricated horizontal cylindrical tanks intended for the fixed underground storage of noncorrosive, stable, flammable and combustible liquids at atmospheric pressure in capacities of up to 50,000 gal (189,270 L) and diameters of up to 12 ft (3.66 m). The combinations of construction materials, containment types, designs, options and liquid ratings are described under **TYPES AND RATINGS** below.

These tanks are intended for installation and use in accordance with ANSI/NFPA 30, "Flammable and Combustible Liquids Code," ANSI/NFPA 30A, "Code for Motor Fuel Dispensing Facilities and Repair Garages," ANSI/NFPA 31, "Installation of Oil-Burning Equipment," ANSI/NFPA 1, "Uniform Fire Code," the "International Fire Code," and/or other requirements of the Authority Having Jurisdiction, and the manufacturer's instructions.

These tanks are provided with one or more containment shells and/or compartments, top openings for pipe connections (for fill, withdraw, monitor, etc.), striker plates, and may optionally be provided with manway openings, connecting rings and lift lugs. Access risers, sumps, piping and other accessories that may be connected to the tank are not covered under this category.

These tanks are not provided with an internal-corrosion-protection, upgrade or lining system investigated by UL, and do not cover field erected or refurbished types, pressure vessels or processing applications that may occur in tanks.

TYPES AND RATINGS

The tank materials, containment types, designs, options and liquid ratings, as indicated in the individual Listings, are defined as follows:

CONTAINMENT PRODUCTS FOR FLAMMABLE AND
COMBUSTIBLE LIQUIDS (ECPR)

Underground Tanks (EGHX)—Continued

(S) Type I or Type II secondary-containment construction, where:

Type I is an external shell with direct contact to the primary shell for at least 300° of containment, and

Type II is an external shell with indirect contact (separated by stand-offs) to the primary shell for a full 360° of containment.

Steel Tanks

These are all-steel tanks constructed and investigated to UL 58, "Steel Underground Tanks for Flammable and Combustible Liquids," and are not provided with an external corrosion-protection system investigated by UL. These tank constructions may be primary (single wall) or secondary (double wall) types, and are suitable for containment of general fuels and similar flammable and combustible liquids, as identified in the (*) liquid ratings:

Underground tank for (*) — A steel primary containment tank with one or more compartments.

(S) secondary-containment underground tank for (*) — A steel primary containment tank wrapped within an external steel shell that provides both secondary containment and interstitial monitoring.

Fiberglass Tanks

These are all-fiberglass tanks constructed and investigated to ANSI/UL 1316, "Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures." These tank constructions may be primary (single wall), secondary (double wall) or tertiary (triple wall) types, and are suitable for containment of general fuels and similar flammable and combustible liquids, as identified in the (#) liquid ratings:

Nonmetallic underground tank for (#) — A primary fiberglass tank with one or more compartments.

(S) secondary-containment nonmetallic underground tank for (#) — A primary fiberglass containment tank wrapped within an external fiberglass shell that provides both secondary containment and interstitial monitoring.

Tertiary-containment nonmetallic underground tank for (#) — A Type I or Type II secondary-containment fiberglass tank completely contained within an external fiberglass shell that provides both tertiary containment and interstitial monitoring.

Corrosion-resistant Tanks

These are base steel tanks (UL 58 primary or secondary types) provided with an external corrosion-protection system constructed and investigated to ANSI/UL 1746, "External Corrosion Protection Systems for Steel Underground Storage Tanks." These tank constructions may be Cathodic (Part I), Composite (Part II), Jacketed (Part III) or Coated (Part IV) types, and are suitable for containment of general fuels and similar flammable and combustible liquids, as identified in the (*) liquid ratings:

Cathodically protected underground tank for (*) — A steel primary tank with a pre-engineered, galvanic-type cathodic-protection system (anode pack with connecting wires and dielectric coating and bushings) that provides external corrosion protection.

Cathodically protected type (S) secondary-containment underground tank for (*) — A steel Type I or Type II secondary-containment tank with a pre-engineered, galvanic-type cathodic-protection system (anode pack with connecting wires and dielectric coating and bushings) that provides external corrosion protection.

Coated underground tank for (*) — A steel primary tank covered directly (bonded) with a thin nonmetallic cladding (min 70 mil PUR) which provides external corrosion protection.

(S) secondary-containment coated underground tank for (*) — A steel Type I or Type II secondary-containment tank covered directly (bonded) with a thin nonmetallic cladding (min 70 mil PUR) which provides external corrosion protection.

Composite underground tank for (*) — A steel primary tank covered directly (bonded) with a thick nonmetallic cladding (min 100 mil FRP) which provides external corrosion protection.

(S) secondary-containment composite underground tank for (*) — A steel Type I or Type II secondary-containment tank covered directly (bonded) with a thick nonmetallic cladding (min 100 mil FRP) which provides external corrosion protection.

Jacketed underground tank for (*) — A steel primary tank completely contained within a nonmetallic external tank jacket (min 100 mil FRP, PUR, PE or Polyurea) which provides secondary containment, interstitial leak monitoring, and external corrosion protection.

Jacketed tertiary-containment underground tank for (*) — A steel Type I or Type II secondary-containment tank completely contained within a nonmetallic external tank jacket (min 100 mil FRP, PUR, PE or Polyurea) which provides tertiary containment, interstitial leak monitoring, and external corrosion protection.

Liquid Ratings

The above tank types are additionally rated in the individual Listings for either one or more general fuel blend ranges, or flammable liquids as follows:

CONTAINMENT PRODUCTS FOR FLAMMABLE AND
COMBUSTIBLE LIQUIDS (ECPR)

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Underground Tanks (EGHX)—Continued

(#) General Fuels — One of the following ratings for commercially available fuels covered by 40CFR80, "Regulation of Fuels and Fuel Additives," and compliant with ASTM Fuel specifications for general-purpose commercial engines (SI or CI) and heating/burning appliances:

Petroleum Products Only — Includes petroleum hydrocarbon fuels without bio-blends ASTM D4814 gasoline (E0), ASTM D975 diesel (B0), ASTM D396 fuel oil (B0), ASTM D3699 kerosene (K1 and K2); and similar flammable or combustible liquid petroleum derivatives, such as fuel components (cetane, hexane, heptane, iso-octane, etc.), and oils (lube, hydraulic, machine, etc.).

Petroleum Products and Gasohol (Unleaded Gasoline with Max 10% Ethanol) — Includes all "Petroleum Products Only" liquids; plus petroleum hydrocarbon fuels with low biofuels blends, such as ASTM D4814 gasoline and ethanol blends (max E10), ASTM D975 diesel and biodiesel blends (max B5), ASTM D396 fuel oil and bio heat blends (max B5).

Petroleum Products, Alcohols and Alcohol-Gasoline Mixtures — Includes all "Petroleum Products and Gasohol" liquids; plus petroleum hydrocarbon fuels with mid-high biofuel blends, such as ASTM D4814 gasoline and ASTM D5798 ethanol blends (E11 - E83), ASTM D7467 mid-range biodiesel blends (B6 - B20), common-fuel-blend stocks and components, such as methanol, ethanol, ASTM D4806 denatured fuel ethanol (nom E97), ASTM D5797 fuel methanol (nom M85), and other fuel-blend combinations thereof.

(*) Flammable Liquids — Includes all liquids in the three "General Fuels" ratings above; plus other stable flammable or combustible liquids with chemical properties similar to the general fuels and liquids described above having generally accepted chemical compatibility with the materials used in the product, such as other alcohols and solvents (pentane, hexanol, acetone, ketone, etc.), or other petroleum derivatives (xylene, toluene, naphtha, turpentine, etc.).

RELATED PRODUCTS

See Underground Tank Lining Systems (EGAY) for nonmetallic internal tank lining and coating systems.

See Underground Tank Upgrade Systems (EGS) for nonmetallic internal tank containment and rating upgrade systems.

ADDITIONAL INFORMATION

For additional information, see Fixed and Stationary Storage Tanks (EDQX), Containment Products for Flammable and Combustible Liquids (ECPR) and Flammable and Combustible Liquids and Gases Equipment (AAPQ).

REQUIREMENTS

The basic standard used to investigate products in this category is one or more of the following:

Steel tanks: UL 58, "Steel Underground Tanks for Flammable and Combustible Liquids"

Fiberglass tanks: ANSI/UL 1316, "Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures"

Corrosion-resistant tanks: ANSI/UL 1746, "External Corrosion Protection Systems for Steel Underground Storage Tanks," with specific requirements for:

Cathodic systems per Part I, "Pre-Engineered Cathodic Protection Systems"

Coated tanks per Part IV, "Coated Tanks"

Composite tanks per Part II, "Composite Tanks"

Jacketed tanks per Part III, "Jacketed Tanks"

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, the appropriate tank construction for the individual Listings as indicated in **TYPES AND RATINGS** above, and the statement "Consult Local Authorities Before Covering This Tank."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CONTROL DAMPERS (EIMZ)**GENERAL**

This category covers control dampers intended for installation in air-handling spaces (plenums). Plenums are defined in ANSI/NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."

These dampers have been subjected to tests to determine the peak rate of heat release, and the maximum peak and average normalized optical smoke density. The performance of the dampers with regard to operability has not been investigated.

Sizes — The maximum sizes expressed in inches representing the maximum width and maximum height, or maximum diameter, are shown in the individual certifications for each damper model.

Abbreviations — The following abbreviations are used in the individual certifications:

- H - Horizontal
- V - Vertical

Authorities Having Jurisdiction should be consulted before installation.

RELATED PRODUCTS

Additional products investigated to UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces," are covered under Discrete Products Installed in Air-handling Spaces - Plenums (BHZF).

Fire dampers, smoke dampers, combination fire and smoke dampers, and corridor dampers are covered under Dampers for Fire Barrier and Smoke Applications (EMME).

Dampers intended for installation in air-handling openings penetrating fire-resistive-membrane ceilings are covered under Ceiling Dampers (CABS).

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces."

Products covered under this category have demonstrated the following rate of heat release and smoke optical density values, through tests conducted in accordance with UL 2043:

1. A peak rate of heat release of 100 kW or less,
2. A peak normalized optical density of 0.50 or less, and
3. An average normalized optical density of 0.15 or less.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

CONTROL DAMPER

AS TO HEAT RELEASE RATE AND SMOKE OPTICAL DENSITY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CONVEYORS (EJJR)

USE AND INSTALLATION

This category covers electrically operated machinery intended for the transport of articles or materials within a building structure, intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," and ANSI/ASME B20.1, "Safety Standard for Conveyors and Related Equipment." It does not cover machinery intended for the transport of persons.

Conveyors are required to employ guards, safety releases, brakes, interlocks, etc., to reduce the likelihood of accidents with respect to the moving mechanism.

Accessory equipment intended for use with conveyors, such as utility distribution systems and electric raceways, is also covered under this category.

Conveyors intended to pass through the walls or floor of a building structure are designed so as not to preclude installation in accordance with Annex B ("Fire Doors: Protection of Conveyor Openings") of ANSI/NFPA 80, "Fire Doors and Other Opening Protectives."

RELATED PRODUCTS

Pneumatically operated document transporting systems are covered under Office Appliances and Business Equipment (QAOT).

Conveyors forming a component part of other equipment are covered under the product category of the particular end product. For example, dishwasher systems having an integral conveyor are covered under Dishwashers, Commercial (DMGR); conveyors used in check-out stands are covered under Motor-operated Check-out Stands (DBNT); and conveyors used in conjunction with an automated manufacturing process are covered under Factory Automation Equipment (GPNY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 73, "Motor-Operated Appliances," and ANSI/ASME B20.1 (2006), "Safety Standard for Conveyors and Related Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the appropriate product name as shown in the individual Listings.

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CORD SETS AND POWER-SUPPLY CORDS (ELBZ)

GENERAL

This category covers (1) cord sets, (2) power-supply cords for use as supply connections for portable appliances, and (3) shore power cable sets for use as supply connections to boats that are moored to a dock.

This category also covers bulk certified power-supply cords that are repackaged from their original packaging.

Cord sets and power-supply cords are not intended to be used as a substitute for the fixed wiring of a structure and, hence, are not intended to be fastened in place. Cord sets and shore power cable sets are rated in volts, amps and watts.

Cord sets, shore power cable sets, and power-supply cords are commonly furnished in hanked or coiled form. If used in this condition, excessive heating may occur. Therefore, when placed into service, all wrappings should be removed, and the flexible cord should be extended for its entire length.

Cord sets and power-supply cords that employ ground-fault circuit interrupter protection are investigated to ANSI/UL 943, "Ground-Fault Circuit-Interrupters," and covered under Ground-fault Circuit Interrupters (KCXS).

For information regarding the flexible cord types and their ratings, see Flexible Cord (ZICZ).

CORD SETS

A cord set consists of a length of flexible cord assembled (1) to an attachment plug or current tap as a line fitting and a cord connector as a load fitting, and with or without a through-cord switch, or (2) with a series-connected current tap and a pendant switch.

Cord sets are designated as one of the following types and are so identified by the Certification Mark:

Cord Set — This is a cord set intended for general use indoors and assembled with general-use flexible cord and general purpose fittings. These cord sets may be less than six feet long. Cord sets shorter than six feet long are marked to indicate their length. Cord sets may also have integral restraint devices to prevent unintentional disconnection of the cord connector from a mating attachment plug of an appliance. Restraint devices that are separate from cord sets are covered under Cord Restraint Devices (ELDW).

Outdoor-use Cord Set — This is a cord set assembled with outdoor type flexible cord without a switch, and which is intended for use outdoor to supply portable electric equipment. It is (1) marked "Suitable For Use With Outdoor Appliances — Store Indoors While Not In Use," (2) suitable for supplying portable outdoor appliances within their marked voltage, amp and wattage rating, (3) intended for use outdoors only while the equipment supplied is in use, and (4) intended to be stored indoors (i.e., where not exposed to sunlight and/or weather) while not in use. Such a cord set has been investigated to determine (1) that the materials in the flexible cord and in the line and load fittings, and (2) the adhesion between the cord jacket and the bodies of the line and load fittings are suitable for periodic use outdoors.

The connection between the attachment plug cap and the outlet device supplying the cord set, and between the supply cord of any connected appliance and the load end of the cord set, should not be subjected to moisture or dampness. Outdoor-use cord sets may also have integral restraint devices to prevent unintentional disconnection of the cord connector from a mating attachment plug of an appliance. Restraint devices that are separate from cord sets are covered under Cord Restraint Devices (ELDW).

Adapter Cord Set — This is an outdoor-use cord set, without a switch, consisting of an attachment plug, a length of extra-hard-usage outdoor-type flexible cord, and one or more load fittings providing:

1. a total of not more than three outlets configured together, or configured with one or more flexible cords, or
2. up to six single-outlet load fittings, provided that each load fitting is in line and spaced apart from the others.

Adapter cord sets are intended for use in areas such as construction sites to provide power to two or three outlets from a single outlet, or to convert from one outlet configuration to another. An adapter cord set with more

than one single-outlet load fitting may have a joint in the flexible cord with the cord branching to two or three cords, each terminating in a single-outlet load fitting.

Cord Set for Recreational Vehicles — This is an outdoor-use cord set intended for use in supplying power to recreational vehicles.

Shore Power Cable Set — A shore power cable set is an outdoor-use cord set that is used in supplying power to boats moored to a dock. They are intended to be stored aboard the boat where not exposed to sunlight and/or weather while not in use. The line and load fittings are of the locking type, rated not less than 20 A and are to be connected to suitable shore power outlet and hull power inlet devices, respectively. The connection of the attachment plug to a shore-based power outlet and the connection of the cord connector to a shore power inlet, aboard a boat, provides a seal against water. Shore power cable sets are also covered under Shore Power Cable Sets, Marine (UBWW).

POWER-SUPPLY CORDS

Power-supply cords may be either the nondetachable type or detachable type. Any item attached to the load end of a nondetachable power-supply cord is not covered under this category.

Power-supply cords are designated as one of the following types and are so identified by the Certification Mark:

Nondetachable Types

Power-supply Cord — This is a power-supply cord consisting of a length of flexible cord assembled with an attachment plug or current tap as a line fitting but without a cord connector (appliance coupler) at the opposite end. It is intended for direct wiring connection to an appliance and may include a through-cord switch. Nondetachable power-supply cords may be one of the following:

- **Power-supply Cord for General Use** — This is a power-supply cord consisting of a suitable fitting for line connection assembled to a length of general-purpose flexible cord, and may include a through-cord switch.

- **Power-supply Cord for Ranges and Dryers** — This is a power-supply cord consisting of a general-use nondetachable power-supply cord constructed using Type SRD or SRDT flexible cable. The flexible cable may employ a neutral conductor which is two AWG sizes smaller than the other circuit conductors, but not smaller than 10 AWG.

Outdoor-use Power-supply Cord — This is a power-supply cord assembled with outdoor-type flexible cord. It is for use with portable outdoor appliances.

Power-supply Cord for Recreational Vehicles — This is an outdoor-use power-supply cord with the outer surface of the flexible cord marked "For Recreational Vehicle Use: ___ Amps."

Power-supply Cord for Mobile Home — This is an outdoor-use power-supply cord with the outer surface of the flexible cord marked "For Mobile Home Use: ___ Amps."

Power-supply Cord - Special Use — A special-use power-supply cord is intended for restricted use and incorporates special design features (such as special cords and fittings) for a specific application. Each is provided with marking pertinent to its proper use, and/or limitations and electrical rating.

Detachable Types

Detachable Power-supply Cord — A detachable power-supply cord consists of a length of flexible cord assembled with (1) an attachment plug or current tap as a line fitting at one end and (2) a single outlet load fitting (appliance coupler) at the opposite end. It is intended for use and packaging with appliances. It may be one of the following types:

- **Detachable Power-supply Cord Having an Appliance Plug** — This is a power-supply cord, not less than 2 feet long, with an appliance plug as a load fitting.

- **Detachable Power-supply Cord Having a Flatiron Plug** — This is a power-supply cord, not less than 6 feet long, having a heater cord and a flatiron plug as a load fitting.

- **Detachable Power-supply Cord for Appliances Rated Not Greater Than 50 W** — This is a power-supply cord for use with hand-held appliances rated 50 W or less and having a load fitting (appliance coupler) for use with electric shavers, electric scissors, electric combs, and the like.

Detachable Power-supply Cord - Special Use — A special-use detachable power-supply cord is intended for restricted use and incorporates special design features (such as special cords and fittings) for a specific application. Each is provided with marking pertinent to its proper use, and/or limitations and electrical rating.

RELATED PRODUCTS

Power-supply cords intended for use with waste disposers are investigated to ANSI/UL 430, "Waste Disposers," and covered under Waste Disposers, Sink Mounted (ZDII). Only those power-supply cords that have been investigated to ANSI/UL 430 are permitted to be marked "Garbage Disposal Cord," or the equivalent.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 817, "Cord Sets and Power-Supply Cords."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate:

- "Cord Set"
- "Outdoor Use Cord Set"
- "Adaptor Cord Set"
- "Cord Set for Recreational Vehicles"
- "Shore Power Cable Set"
- "Power Supply Cord"
- "Replacement Power Supply Cord"
- "Outdoor Use Power Supply Cord"
- "Replacement Outdoor Use Power Supply Cord"
- "Power Supply Cord for Recreational Vehicles"
- "Power Supply Cord for Mobile Home"
- "Power Supply Cord - Special Use"
- "Detachable Power Supply Cord"
- "Replacement Detachable Power Supply Cord"
- "Detachable Power Supply Cord - Special Use"

All Listing Marks are applied to each individual piece except for "Power Supply Cord," "Outdoor Use Power Supply Cord" and "Detachable Power Supply Cord." These products are bulk labeled (label applied to smallest container indicating number of pieces) and are not intended for field application.

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CORD-RESTRAINT DEVICES (ELDZ)

GENERAL

This category covers devices provided with retention means intended to reduce the likelihood of an attachment plug of an appliance becoming unintentionally detached from a mating cord connector of a cord set or a fixed receptacle. These devices are constructed such that (1) the plug and mating connector or receptacle are not enclosed so as to permit dissipation of any heat generated at the connection, and (2) the plug can be separated from the mating cord connector or receptacle without the use of a tool.

These devices are not an integral or permanently attached component of a cord set or receptacle, but rather are separate add on devices. Cord-restraint devices that are integral or permanently attached to a cord set are covered under Cord Sets and Power-supply Cords (ELBZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used as a guide to investigate products in this category is ANSI/UL 817, "Cord Sets and Power Supply Cords."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cord Restraint Device," or other appropriate product name.

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OUTDOOR SEASONAL-USE CORD-CONNECTED WIRING DEVICES (ELEI)

USE AND INSTALLATION

This category covers cord-connected wiring devices intended for temporary outdoor use only, for a period not to exceed 90 days. These devices are intended for use with outdoor equipment, Christmas tree and other

Outdoor Seasonal-use Cord-connected Wiring Devices (ELEI)—Continued

seasonal decorative-lighting outfits. They may be provided with integral overcurrent protection, clock operated and/or photoelectric switches.

These devices are not intended for permanent installation. Devices equipped with a grounding pin to provide protection against electric shock are intended to be plugged into a ground-fault circuit-interrupting (GFCI) receptacle.

ADDITIONAL INFORMATION

For additional information, see Cord Sets and Power-supply Cords (ELBZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2438, "Outdoor Seasonal-Use Cord-Connected Wiring Devices."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Outdoor Seasonal Use Cord-connected Wiring Device."

The Listing Mark for this category requires the use of a holographic label.

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SEASONAL-USE CORD SETS (ELEV)**USE**

This category covers cord sets intended for indoor use only with Christmas tree and similar seasonal decorative-lighting outfits. They are provided with integral overcurrent protection and may incorporate outlet fittings that are factory assembled onto the flexible cord between the end fittings. They are not intended for permanent installation or for use with other than seasonal lighting products.

ADDITIONAL INFORMATION

For additional information, see Cord Sets and Power-supply Cords (ELBZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 817, "Cord Sets and Power-Supply Cords."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Seasonal Use Cord Set."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

UTILITY-SERVICE CORD SETS (ELFT)**GENERAL**

This category covers utility-service cord sets having an attachment plug of a unique, nonstandard configuration intended for mating with a utility-service receptacle (see Utility-service Receptacles [RVNWX]), which utilizes the grounded neutral conductor of the supply as the equipment grounding conductor. These cord sets have been investigated with regard to protection from the risk of electrical shock and their ability to function without overheating.

These cord sets are intended for use only by authorized utility company personnel in obtaining power from utility poles and as marked (e.g., 125 V, 15 A).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 817, "Cord Sets and Power-Supply Cords."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and

Utility-service Cord Sets (ELFT)—Continued

Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**UTILITY SERVICE CORD SET
AS TO PROTECTION FROM ELECTRIC SHOCK
AND ABILITY TO FUNCTION WITHOUT OVERHEATING**

No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CORD SETS WITH LEAKAGE-CURRENT DETECTION AND INTERRUPTION (ELGN)

GENERAL

This category covers cord sets provided with leakage-current detection and interruption. These products are intended to sense leakage currents flowing between or from the conductors of the cord set and interrupt the circuit. Under certain conditions, if this leakage current is allowed to continue flowing from the conductors, risk of ignition of surrounding combustible materials may result.

When leakage current above a predefined limit is detected, the device removes the supply source from the cord either electronically or via "air break" contacts. The cord remains de-energized until the condition causing the excessive leakage current has cleared or the device has been manually reset.

"Test" and "Reset" buttons, if provided, are not intended for on/off control of the connected load unless specifically marked "ON/OFF."

These devices do not provide ground-fault protection of equipment as required by Article 426 of ANSI/NFPA 70, "National Electrical Code" (NEC), nor are these devices ground-fault circuit interrupters for personnel protection as defined by the NEC.

The ability of the devices to sense and interrupt leakage currents in locations other than the integral cord set has not been investigated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1699, "Arc-Fault Circuit Interrupters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cord Set with Leakage Current Detection and Interruption."

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CORROSION-MEASURING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (ELHN)

USE AND INSTALLATION

This category covers corrosion-measuring equipment, including control units, indicators, sensors, probes and auxiliary devices used as part of corrosion-measuring systems.

Certain products in this category are associated apparatus and are intended for installation in unclassified locations. They are provided with intrinsically safe circuit(s) as indicated on the product, for extension into a hazardous (classified) location.

UNEVALUATED FACTORS

The accuracy of the equipment covered under this category has not been investigated.

CORROSION-MEASURING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (ELHN)

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Corrosion Measuring Equipment for Use in Hazardous Locations" or "Corrosion Measuring Equipment (Associated Apparatus)," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CORROSION-MEASURING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (ELHS)

USE AND INSTALLATION

This category covers corrosion-measuring equipment, including control units, indicators, sensors, probes and auxiliary devices, used as part of corrosion-measuring systems.

Certain products in this category are associated apparatus and are intended for installation in unclassified locations. They are provided with intrinsically safe circuit(s) as indicated on the product, for extension into a hazardous location.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Corrosion Measuring Equipment for Use in Hazardous Locations" or "Corrosion Measuring Equipment (Associated Apparatus)," or other appropriate product name as shown in the individual Listings.

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CRANE AND HOIST ELECTRIFICATION SYSTEMS (ELPX)

GENERAL

This category covers crane and hoist electrification systems designed to provide electrical power from a fixed source to moving equipment.

Rigid electrification systems consist of insulated contact conductors, collectors and feed-in devices, together with supports by which the system may be mounted on tram rails, crane bridges or hoist runways.

Festoon electrification systems consist of moving carriers and feed-in devices that support separately supplied flexible cable and which may be mounted on tram rails, crane bridges or hoist runways with sufficient cable slack to allow moving equipment to travel a limited distance.

INSTALLATION

These systems are intended for installation in accordance with Article 610 of ANSI/NFPA 70, "National Electrical Code."

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, Authorities Having Jurisdiction and others concerned with the installation.

CRANE AND HOIST ELECTRIFICATION SYSTEMS (ELPX)

PRODUCT CATEGORIES BY CATEGORY CODE

RATINGS

The maximum voltage rating is 600 V. Each system is rated in volts, frequency and continuous current. Some systems are duty cycle as well as continuous rated. These systems have been tested for a one minute "on," one minute "off" cycle. The applicable ampere ratings are marked on the contact conductor or its sheath. Conductor overcurrent protection should not exceed the duty cycle rating.

ENVIRONMENTAL CONDITIONS

Some rigid systems are suitable for outdoor use and are so marked on a main nameplate. See Electrical Equipment for Use in Ordinary Locations (AALZ) for additional information on environmental conditions and ratings.

SPECIAL CONSIDERATIONS

Crane and hoist electrification systems have not been investigated for mechanical load-carrying ratings. Systems marked with a mechanical load-carrying rating also bear the following marking: "Mechanical load carrying ratings have not been investigated by UL."

Crane and hoist electrification systems have not been investigated for use in corrosive atmospheres.

RELATED PRODUCTS

Festoon system flexible cable is covered under Wire, Special Purpose (ZMHX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 508, "Industrial Control Equipment," and UL 857, "Busways."

UL MARK

The Listing Mark of UL on each part or on the smallest unit container in which the complete system is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name on each part (e.g., "Conductor," "Collector," "Insulator") or the name "Crane and Hoist Electrification System" on the smallest complete system container.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CRANE EQUIPMENT OVER 600 VOLTS (ELRK)

USE AND INSTALLATION

This category covers the following crane equipment with voltage ratings above 600 V:

Load Insulating Links — Mechanical devices designed to physically support a mechanical load. Load insulating links provide electrical separation between an energized conductor and a crane or other object.

Tag Line Insulating Links — Mechanical devices designed to provide supplemental isolation between a tag line and the load being guided. Tag line insulating links are not designed to support a mechanical load or to be the primary insulation between energized objects and the individual guiding the load.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, Authorities Having Jurisdiction, and others concerned with the installation.

Environmental Conditions

Load insulating links and tag line insulating links are suitable for outdoor use, but have not been investigated for use in corrosive atmospheres.

RATINGS

Both load insulating links and tag line insulating links have a rated operating voltage (RO), which is the maximum operating voltage, expressed in rms, of the insulator. Insulating links may be used in series, in which case the voltage ratings are additive (e.g., two 25 kV insulators in series provide an effective RO of 50 kV). Insulating links also have a routine proof test voltage (RTV), which is equal to 120% of the RO.

Load insulating links have a specified mechanical load (SML), which is the maximum operating load that may be applied to the link. Load insulating links are not intended to be used in parallel to increase the mechanical ratings.

Tag line insulating links have no mechanical load rating, and are not intended to be used to support a mechanical load.

Load insulating links and tag line insulating links have a minimum sustained operating temperature (MIT) and a maximum sustained operating temperature (MOT), which are the minimum and maximum ambient temperatures (respectively) within which the links are intended to be used.

PRODUCT MARKINGS

Each insulating link is marked with the name or trademark of the manufacturer, simplified operating instructions, the year of manufacture, unique serial number, and weight. The rated SML, RO, MIT and MOT are also marked on each link. Each link is marked with the RTV, which is identified by the word "TEST."

Tag line insulating links are marked "For Tag Line Use Only."

Insulating links designed for foundry use are marked "For Foundry Use Only" and "Not for Use in Construction Industry."

Insulating links designed for radio-frequency suppression use are marked "For Radio Frequency Suppression Use Only" and "Not for Use in Construction Industry."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2737, "Crane Insulators."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Load Insulating Link" or "Tag Line Insulating Link."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CURRENT TAPS AND ADAPTERS (EMDV)

GENERAL

This category covers current taps and adapters for use in accordance with ANSI/NFPA 70, "National Electrical Code."

This category does not cover current taps or adapters rated at more than 200 A or for more than 600 V nor does this category directly apply to current taps wired to flexible cord or lampholder adapters, but supplements the standards for lampholder adapters covered in ANSI/UL 496, "Lampholders," and current taps that can be wired to flexible cord covered in ANSI/UL 498, "Attachment Plugs and Receptacles."

This category does not cover cord-connected, relocatable power taps intended only for indoor use as a temporary extension of a grounding, alternating-current branch circuit for general use, which are covered in UL 1363, "Relocatable Power Taps," nor does this category cover the current or voltage conversion circuitry capable of being used in travel adapters.

For purposes of this category, the following definitions apply:

Adapter — A device that adapts one blade or slot configuration to another (including a grounding adapter for a nongrounding receptacle). [See Attachment Plugs, Fuseless (AXUT) for certifications of similar products.]

Current Tap — A male and female contact device that, when connected to an outlet receptacle or cord set, provides multiple outlets or outlet configurations. An outlet configuration may consist of a slot configuration, or provision for the connection of flexible cord.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 498A, "Current Taps and Adapters."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Current Tap," "Tap," "Cube Tap" or "Adapter."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CUSTOM-BUILT KIOSKS (EMHH)

GENERAL

This category covers kiosks, rated 240 V or less, normally found in malls, retail stores, offices and business establishments, educational facilities and other similar environments.

These kiosks are intended but not limited for business applications, electronic point-of-sale, information exchange, Internet access or ticket dispensing.

Kiosks consist of a cabinet that typically contains a power-supply adapter(s), monitor(s), computer(s), currency-processing equipment, printer(s), fan(s) and speaker(s).

Kiosks are provided with assemblies or subassemblies, consisting of components such as amplifiers, cabling, CD-ROM drive, floppy drive, clock, keyboard, CPU/monitor, DVD player or from a database on network-server computer, ethernet card (dial-up connection or network link), input devices: trackball, number pad, light-pen/stylus, (magnetic strip) card reader, bar code reader, character keyboard (physical or virtual), Internet connectivity, a light sensor that enables automatic adjustment of the monitor intensity, modems, monitor (touch-screen capacity), movement detector used to call attention of passersby, multimedia machine with ample RAM and fast hard-drive access, power supply; **printers:** laser, dot matrix, thermal; serial ports (touch-screen), serial and printer ports for any peripheral devices, such as modems or ISDN boards for communications and digital or analog I/O board used to control different types of processes, stereo speakers, telecommunications, telephone accessories, "Watched" timer that can ensure the system resets in unlikely case of hang-ups, UPS or video graphics card.

EQUIPMENT TYPES

Assemblies and subassemblies may include but are not limited to central processing units (CPUs), disk drives, fiber optic transceivers, monitors, personal computers, plotters, printers, point-of-sale kiosks, scanners (including portable bar code scanners), tape drives, workstations; **multimedia equipment/accessories:** digital cameras, microphones, speakers, video conferencing systems, network connection equipment; **telecommunication equipment:** telephone sets, facsimile machines, ISDN systems and telephones, modems, key telephone systems; **reproduction equipment:** copiers, duplicating machines; **interconnecting cable assemblies:** cable assemblies intended for use within the kiosk.

INSTALLATION

Kiosks are intended to be installed in an indoor environment unless identified otherwise in the individual certifications. Kiosks have been determined to be suitable for use in ambient temperatures not exceeding the manufacturer's recommended ambient temperature as specified in the equipment's installation instructions. Kiosks may be cord-and-plug connected or configured for permanent wiring methods. Some kiosks may not be provided with a complete enclosure and are intended for building into a structure as specified in the equipment's installation instructions.

FACTORS NOT INVESTIGATED

Kiosks have not been investigated for security (card readers, badge readers, currency-processing equipment and similar equipment) unless identified in the individual certifications. Kiosks are not intended to dispense merchandise.

The physiological effects of chemical substances used in or with this equipment have not been investigated. The long-term characteristics or the possible physiological effects of radio frequency (RF) electromagnetic fields associated with this equipment have not been investigated.

RELATED EQUIPMENT

Automated teller machines (ATMs) investigated for security and burglary resistance are covered under Automated Teller Systems (TPEU).

ATMs that have not been investigated for security and burglary protection are covered under Bank Equipment (BALT).

Machines for vending nonrefrigerated food and beverages, general merchandise, etc., are covered under Vending Machines (YWXV).

Machines for vending refrigerated food and beverages are covered under Vending Machines, Refrigerated (SQMX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate the individual assembly and subassembly components in this category is ANSI/UL 60950, "Information Technology Equipment Safety - Part 1: General Requirements."

The basic requirements used to investigate the overall product consisting of various assemblies and subassemblies enclosed in a cabinet in this category are contained in UL Subject 2361, "Outline of Investigation for Custom-Built Kiosks."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word

CUSTOM-BUILT KIOSKS (EMHH)

"LISTED," a control number, and the product name "Custom-built Kiosk," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DAMPERS FOR FIRE BARRIER AND SMOKE APPLICATIONS (EMME)

GENERAL

This category covers fire dampers, smoke dampers (leakage-rated dampers), combination fire and smoke dampers (fire and leakage-rated dampers), and corridor dampers.

Installation — All dampers covered under this category are intended to be installed in accordance with the installation instructions provided with the dampers. Authorities Having Jurisdiction should be consulted before installation. Unless otherwise indicated in the installation instructions, the annular space between the sleeves of fire dampers, combination fire and smoke dampers, or corridor dampers and the wall opening should not be filled with firestop materials such as fill, void or cavity materials.

Air-flow and Pressure Ratings — Fire dampers for use in dynamic systems, smoke dampers, combination fire and smoke dampers, and corridor dampers are marked with the maximum air flow and static pressure HVAC system conditions for which the damper has been investigated. The air-flow (velocity) ratings are established in increments of 1000 CFM/ft² of damper area (FPM), with the minimum being 2000 CFM/ft². The air-flow ratings are established based on test conditions with the damper in the full open position. The static pressure ratings are established in increments of 2 in.WG, with the minimum being 4 in.WG. The static pressure ratings are established based on test conditions with the damper in the full closed position.

Sizes — The maximum sizes expressed in inches representing the maximum width and maximum height are shown in the individual certifications for each fire damper model, for both single sections and multiple section assemblies.

Abbreviations — The following abbreviations are used in the individual certifications:

Fire-protection Rating

- HR Class — Hourly Classification

Damper-mounting Position

- V — Vertical
- H — Horizontal
- V, H — Vertical & Horizontal

Maximum Damper Size

- W — Width
- H — Height

FIRE DAMPERS

Fire dampers are intended for installation where air ducts penetrate or terminate at openings in walls or partitions; in air transfer openings in partitions; and where air ducts extend through floors as specified in ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems." Fire dampers are prescribed for use by codes such as the "International Building Code" (IBC), "International Mechanical Code" (IMC) and "Uniform Mechanical Code" (UMC).

Fire dampers have been investigated for fire-protection ratings of 1-1/2 or 3 h as indicated in the individual certifications.

Fire Dampers for Use in Dynamic Systems — Fire dampers for use in dynamic systems are intended for use in dynamic HVAC systems that remain operational during a fire, and may also be employed in static systems.

Fire Dampers for Use in Static Systems — Fire dampers for use in static systems are intended for use only in static HVAC systems that are automatically shut down in the event of a fire.

SMOKE DAMPERS

Smoke dampers (leakage-rated dampers) are intended for the protection of openings in smoke barriers, or in engineered smoke-control systems as specified in ANSI/NFPA 90A. Smoke dampers are prescribed for use by codes such as the IBC, IMC and UMC.

Leakage ratings for smoke dampers are identified as Class Designation I, II or III as shown in the following table. Leakage ratings of the dampers are established at a minimum differential pressure of 4 in. water gauge (WG), across the closed damper. Leakage rates may also be established at higher differential pressures, in increments of 2 in. water gauge.

Maximum Leakage (CFM/ft²)

DAMPERS FOR FIRE BARRIER AND SMOKE APPLICATIONS (EMME)

Class	4 In. WG	6 In. WG	8 In. WG	10 In. WG	12 In. WG
I	8.0	9.5	11.0	12.5	14.0
II	20.0	24.0	28.0	31.5	35.0
III	80.0	96.0	112.0	125.0	140.0

Leakage ratings for smoke dampers are determined at elevated temperatures. The elevated temperatures are in increments of 100°F with the minimum temperature being 250°F. Leakage ratings of smoke dampers are established based on test conditions using heated air.

Certified dampers are marked with respect to the Leakage Class at elevated test temperature.

COMBINATION FIRE AND SMOKE DAMPERS

Combination fire and smoke dampers (fire and leakage-rated dampers) are intended for use in locations that are designated as both fire barriers and smoke barriers. These products can also be described as combination fire/smoke dampers as defined by the IBC. Combination fire and smoke dampers have been investigated for both a fire-protection rating of 1-1/2 or 3 h, and a leakage rating as defined under **SMOKE DAMPERS**. Leakage ratings of combination fire and smoke dampers are determined at an elevated temperature 250°F or 350°F. Leakage ratings of combination fire and smoke dampers are established based on test conditions using heated air.

CORRIDOR DAMPERS

Corridor dampers are intended for use where air ducts penetrate or terminate at horizontal openings in the ceilings of interior corridors, as defined in the "City of Los Angeles Building Code," IBC, or where permitted by the Authority Having Jurisdiction.

Corridor dampers have been investigated for, and are intended for, installation only in specific corridor ceiling constructions as defined in the installation instructions provided with each damper.

Corridor dampers have been investigated for both a fire-resistance rating of 1 h, and a Class I or II leakage rating as defined under **SMOKE DAMPERS**. Leakage ratings of corridor dampers are determined at an elevated temperature 250°F or 350°F. Leakage ratings of corridor dampers are established based on test conditions using air. Corridor dampers have also demonstrated acceptable closure performance when subjected to 150 fpm velocity across the face of the damper during fire exposure.

MAINTENANCE

Fire dampers, smoke dampers, combination fire and smoke dampers, and corridor dampers may require periodic maintenance to ensure continued proper operation. The level of maintenance required is dependent on several factors including the product manufacturer's and system designer's recommendations, code requirements, and the complexity of the system in which the damper is installed.

It is recommended that periodic maintenance of dampers include at least the following:

- Removal of debris buildup from the damper and surrounding area
- Manual cycling of dampers released by fusible links
- Cycling of damper and actuator assemblies

Additional information on periodic inspection, testing, and maintenance of fire dampers, combination fire and smoke dampers, and ceiling dampers can be found in ANSI/NFPA 80, "Fire Doors and Other Opening Protectives."

Additional information on periodic inspection, testing, and maintenance of smoke dampers and combination fire and smoke dampers can be found in ANSI/NFPA 105, "Installation of Smoke Door Assemblies and Other Opening Protectives."

Additional information on periodic testing of smoke-control systems can be found in ANSI/NFPA 92, "Smoke Control Systems."

RELATED PRODUCTS

For dampers intended for installation in air-handling openings penetrating fire-resistive membrane ceilings, see Ceiling Dampers (CABS).

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Fire Resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate fire dampers for use in dynamic systems and fire dampers for use in static systems in this category is ANSI/UL 555, "Fire Dampers."

The basic standard used to investigate smoke dampers in this category is ANSI/UL 555S, "Smoke Dampers."

Combination fire and smoke dampers, and corridor dampers are investigated to the applicable requirements of both ANSI/UL 555 and ANSI/UL 555S.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

DAMPERS FOR FIRE BARRIER AND SMOKE APPLICATIONS (EMME)

FIRE DAMPER FOR USE IN DYNAMIC SYSTEMS

+ HR
No.

or

FIRE DAMPER FOR USE IN STATIC SYSTEMS

+ HR
No.

or

SMOKE DAMPER LEAKAGE RESISTANCE CLASS ++ - +++

No.
or

COMBINATION FIRE AND SMOKE DAMPER

LEAKAGE RESISTANCE CLASS ++ - +++

No.
or

CORRIDOR DAMPER

LEAKAGE RESISTANCE CLASS ++ - +++

No.

+ 1, 1-1/2 or 3
++ I, II or III

+++ Elevated test temperature, °F

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DATA PROCESSING CABLE (EMRB)

GENERAL

This category covers Type DP data processing cable for use in computer rooms and under the raised floors of computer rooms in accordance with Article 645 of ANSI/NFPA 70, "National Electrical Code." The cable consists of one or more insulated conductors that are covered with a nonmetallic jacket. The cable may contain grounding conductors and/or optical fiber members.

PRODUCT MARKINGS

Data processing cable is identified by marking on the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

DP-1 — Indicates cable rated 600 V in conductor sizes 18 AWG to 1000 kcmil copper or 12 AWG to 1000 kcmil aluminum or copper-clad aluminum. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in ANSI/UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

DP-1P — Indicates cable rated 600 V in conductor sizes 18 AWG to 1000 kcmil copper or 12 AWG to 1000 kcmil aluminum or copper-clad aluminum. This cable meets the requirements of ANSI/NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

DP-2 — Indicates cable rated 300 V in conductor sizes 24 to 8 AWG copper or 12 to 8 AWG aluminum or copper-clad aluminum. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in ANSI/UL 1581.

DP-2P — Indicates cable rated 300 V in conductor sizes 24 to 8 AWG copper or 12 to 8 AWG aluminum or copper-clad aluminum. This cable meets the requirements of ANSI/NFPA 262.

DP-3 — Indicates cable with no voltage rating in conductor sizes 30 to 10 AWG copper for general use and copper-clad steel for use in coaxial conductors. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in ANSI/UL 1581.

DP-3P — Indicates cable with no voltage rating in conductor sizes 30 to 10 AWG copper for general use and copper-clad steel for use in coaxial conductors. This cable meets the requirements of ANSI/NFPA 262.

Type DP-3 and Type DP-3P cable is for use in circuits having maximum available ac voltage of 30 V, dc voltage of 60 V, peak voltage of 42.2 V, VA of 100 and current of 8 A or in circuits designated DP-3 in UL 60950, "Information Technology Equipment."

Cable with aluminum conductors is surface printed "AL."

Cable with copper-clad aluminum conductors is surface printed "AL (CU-CLAD)" or "Cu-Clad."

Type DP-1, DP-2 and DP-3 cable that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surfaced marked with the suffix "-LS."

DATA PROCESSING CABLE (EMRB)

The temperature rating of the cable is 60°C unless otherwise marked on the cable.

Cable containing optical fiber members is identified with the suffix "OF." Type DP-1, DP-2 and DP-3 cable which has a damage height that does not exceed 4 ft. 11 in. when tested in accordance with the FT-4 Vertical-Tray Flame Test in ANSI/UL 1581 may have the additional marking "FT-4" on the surface.

For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1690, "Data Processing Cable."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Data Processing Cable, Type DP."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DATA PROCESSING EQUIPMENT, ELECTRONIC (EMRT)

USE AND INSTALLATION

This category covers individual units and systems primarily electronic in function and design, which are intended to accumulate, process or store data, and are intended for use in computer rooms or other areas set aside for purpose. Various groupings of equipment are included in this category, such as:

Data processing equipment: Computers, disk drives, memories, modems, tape drives, terminals.

Desk-top aides: Typewriters, staplers, tape dispensers, pencil sharpeners, erasers, calculators, adding machines, dictation and transcribing machines, microfilm readers, display units.

Mailing, banking and currency-handling equipment: Cash registers, coin counters, feeders and dispensers, accounting machines, check writers, signers and daters, mailing, inserting, numbering and stamping machines, writing machines.

Office aids: File cabinets, collators, sorters, shredders, delevators, cutters, stackers, bursters, conveyors, folding, embossing and sealing machines.

Reproduction equipment: Duplicating machines, copiers, reproduction printers, microfilm printers, exposure machines, processors, enlargers, transparency makers, facsimile machines.

Many of these units and systems require special installation such as separate transformer and branch-circuit power, power supplies, special grounding methods, high-frequency motor generator equipment, air conditioning, etc. Such features are covered in the manufacturer's installation instructions.

The individual units comprising a system installation are designed to be interconnected by means of one or more of the wiring methods outlined in Article 645 of ANSI/NFPA 70, "National Electrical Code."

When certified equipment intended for use with a detachable power-supply cord is not provided with such a cord, a cord suitable for connection of the equipment to the branch circuit is separately provided.

ACCESSORIES

Field-installed accessories to certified equipment are provided with suitable markings and/or instructions detailing proper installation or assembly of the accessory with either specific or generic certified equipment specified in the markings or instructions.

PHYSIOLOGICAL EFFECTS

The physiological effects of chemical substances used in or with this equipment have not been investigated.

RELATED PRODUCTS

Air conditioning equipment intended for use with computer rooms or other areas in which data processing equipment is installed is covered under Air Conditioners, Special Purpose (ACVS) and Heating and Cooling Equipment (LZFE).

Fire-resistant materials, sprinklers, extinguishers, and associated equipment recommended by ANSI/NFPA 75, "Fire Protection of Information Technology Equipment," for computer rooms is covered under Carbon Dioxide Extinguishers (FXHV) and Halogenated Agent Extinguishing System Units (GLER).

Smoke detectors are covered under Smoke-automatic Fire Detectors (UROX); alarm equipment is covered under Single- and Multiple-station Smoke Alarms (UTGT).

Equipment associated with data processing but not intended for use in computer rooms is covered under Graphic Arts Equipment (KCQT), Teaching and Instruction Equipment (WYFW), Office Appliances and Business Equipment (QAOI) and Medical Equipment (PIDF).

Card readers, badge readers and similar identification equipment covered under this category has not been investigated with respect to security. Equipment investigated with respect to security or burglary resistance is covered under Access Control System Units (ALVY), Antitheft Alarms and Devices (ATIT), and other associated categories.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 478, "Electronic Data-Processing Units and Systems."

As of April 1, 2000, new product submittals for electronic data processing equipment are investigated to ANSI/UL 60950-1, "Information Technology Equipment – Safety – Part 1: General Requirements," and are covered under Information Technology Equipment Including Electrical Business Equipment (NWGQ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Data Processing Equipment," "Electronic Data Processing Equipment" (or "E.D.P. Equipment"), "Card Punch," "Card Reader," "Computer," "Data Set," or the name of the specific type of product as shown in the individual Listings.

The Listing Mark for field-installed accessories includes the word "Accessory."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRIC SIGNS VERIFIED FOR ENERGY EFFICIENCY IN ACCORDANCE WITH CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 6, SECTION 148 (ENVS)

GENERAL

This category covers new-construction indoor and outdoor electric signs and changing-message signs verified for energy efficiency.

RELATED PRODUCTS

See Signs (UXYT) and Signs, Changing Message (UYFS) for information relating to the Listing of these products.

REQUIREMENTS

These products are Verified for energy efficiency in accordance with the California Code of Regulations, Title 24, Part 6, Section 148 (2008), "California Building Standards Code; California Energy Code."

UL MARK

Signs covered under UXYT and UYFS are eligible to bear the UL Energy Verification Mark when investigated for UL Listing and energy efficiency. The UL Listing Mark and the UL Energy Verification Mark will always appear together on signs covered under this program.

The Energy Verification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Energy Verification Mark for these products includes the Listing Mark for Signs (UXYT) or Signs, Changing Message (UYFS) and the following additional information:

1. The UL Leaf symbol with the words "Energy Verified"
2. The text "California Code of Regulations, Title 24, Part 6, Section 148"
3. Identification of the method of compliance with Section 148

The Verification Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DATA PROCESSING EQUIPMENT, ELECTRONIC FOR USE IN HAZARDOUS LOCATIONS (ENWS)

GENERAL

This category covers individual units and systems, primarily electronic in function and design, which are intended to accumulate, process or store data, and which are intended for use in or have circuits or system units intended for use in areas classified as hazardous locations.

Many of these units and systems require special installation, such as a separate transformer and branch circuit power, power supplies, special grounding methods, high-frequency motor generator equipment, etc. Such features are covered in the manufacturer's installation instructions.

Intrinsically safe equipment is so marked on the product.

To maintain the intrinsically safe features of battery-operated appliances, only batteries of the type and size indicated on the product should be used.

RECONDITIONED PRODUCTS

This category also covers data processing equipment that is reconditioned by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills (reconditioned data processing equipment may also be referred to as rebuilt). Reconditioned data processing equipment is reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned parts. Reconditioned data processing equipment is subject to the same requirements as new data processing equipment.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Data Processing Equipment for Use in Hazardous Locations," "Electronic Data Processing Equipment for Use in Hazardous Locations" (or "E.D.P. Equipment for Use in Hazardous Locations"), "Data Processing Equipment with Circuits for Use in Hazardous Locations," "Electronic Data Processing Equipment with Circuits for Use in Hazardous Locations" (or "E.D.P. Equipment with Circuits for Use in Hazardous Locations"), "Data Processing Equipment (Associated Apparatus)," "Electronic Data Processing Equipment (Associated Apparatus)" (or "E.D.P. Equipment (Associated Apparatus)"), or the name of the specific type of product as shown in the individual Listings.

For reconditioned products, the word "Reconditioned" or "Rebuilt" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DATA PROCESSING EQUIPMENT, ELECTRONIC FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (ENYB)

GENERAL

This category covers individual units and systems, primarily electronic in function and design, which are intended to accumulate, process or store data, and which are intended for use in or have circuits or system units intended for use in areas classified as hazardous locations.

Many of these units and systems require special installation, such as a separate transformer and branch-circuit power, power supplies, special grounding methods, high-frequency motor-generator equipment, etc. Such features are covered in the manufacturer's installation instructions.

Intrinsically safe equipment is so marked on the product.

PRODUCT CATEGORIES BY CATEGORY CODE

140 DATA PROCESSING EQUIPMENT, ELECTRONIC FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (ENYB)

To maintain the intrinsically safe features of battery-operated appliances, only batteries of the type and size indicated on the product should be used.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Data Processing Equipment for Use in Hazardous Locations," "Electronic Data Processing Equipment for Use in Hazardous Locations" (or "E.D.P. Equipment for Use in Hazardous Locations"), "Data Processing Equipment with Circuits for Use in Hazardous Locations," "Electronic Data Processing Equipment with Circuits for Use in Hazardous Locations" (or "E.D.P. Equipment with Circuits for Use in Hazardous Locations"), "Data Processing Equipment (Associated Apparatus)," "Electronic Data Processing Equipment (Associated Apparatus)" (or "E.D.P. Equipment (Associated Apparatus)"), or the name of the specific type of product as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DIELECTRIC MEDIUMS (EOUV)

USE

This category covers liquids intended for use as dielectric and cooling mediums. The liquids are not intended to replace mineral oil unless equipment is also designed for the specific liquid.

These products have been certified as to their fire hazard only, using UL's method for classification of the fire hazard of liquids. They have been rated on a numerical scale of hazard ranging from 0 to 100 as indicated in the table below:

General Classification	Numerical Classification
Diethyl ether	100
Gasoline	90 to 100
Ethyl alcohol	60 to 70
Kerosene	30 to 40 ^a
Paraffin oil	10 to 20 ^b
Water or nonflammable	0 or nonflammable

^a A standard kerosene of 100°F (37.8°C) flash point (closed cup) is rated 30 to 40.

^b A paraffin oil of 440°F (226.7°C) flash point (closed cup) is rated 10 to 20.

RELATED PRODUCTS

Liquids intended for use as dielectric and cooling mediums in electrical transformers are covered under Transformer Fluids (EOVK).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Flammable and Combustible Liquids and Gases Equipment (AAPQ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 340, "Tests for Comparative Flammability of Liquids."

UL MARK

The Classification Mark of UL on the product container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY]

CLASSIFIED _____

AS TO FIRE HAZARD ONLY

Control No.

The Classification Mark may also include the following statement as appropriate:

MAY EVOLVE FLAMMABLE GASES WHEN DECOMPOSED BY AN ELECTRIC ARC

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

DIELECTRIC MEDIUMS (EOUV)

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFORMER FLUIDS (EOVK)

USE

This category covers liquids intended for use as dielectric and cooling mediums in electrical transformers.

These products have been certified as to their fire hazard using UL's method for classification of the fire hazard of liquids. They have been rated on a numerical scale of hazard ranging from 0 to 100 as indicated in the table below:

General Classification	Numerical Classification
Diethyl ether	100
Gasoline	90 to 100
Ethyl alcohol	60 to 70
Kerosene	30 to 40 ^a
Paraffin oil	10 to 20 ^b
Water or nonflammable	0 or nonflammable

^a A standard kerosene of 100°F (37.8°C) flash point (closed cup) is rated 30 to 40.

^b A paraffin oil of 440°F (226.7°C) flash point (closed cup) is rated 10 to 20.

USE RESTRICTIONS

Products certified as "less-flammable liquid" may have use restrictions on the product container. Certain fluids have fuse use restrictions which require that the fuse must be either a type which does not vent under normal operation, or it must be installed external to the transformer tank.

RELATED PRODUCTS

Liquids intended for use as dielectric and cooling mediums are covered under Dielectric Mediums (EOUV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Flammable and Combustible Liquids and Gases Equipment (AAPQ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 340, "Tests for Comparative Flammability of Liquids."

These products are also certified as a "less-flammable liquid" or "nonflammable fluid" in accordance with Sections 450.23 or 450.24 of ANSI/NFPA 70, "National Electrical Code."

UL MARK

The Classification Mark of UL on the product container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY]

CLASSIFIED _____

AS TO FIRE HAZARD ONLY

Control No.

The Classification Mark may also include one or more of the following statements as appropriate:

MAY EVOLVE FLAMMABLE GASES WHEN DECOMPOSED BY AN ELECTRIC ARC

ALSO CLASSIFIED AS A "LESS-FLAMMABLE LIQUID" IN COMPLIANCE WITH THE NATIONAL ELECTRICAL CODE WITH THE FOLLOWING "USE RESTRICTIONS"

ALSO CLASSIFIED AS A "NONFLAMMABLE FLUID" IN COMPLIANCE WITH THE NATIONAL ELECTRICAL CODE WITH THE FOLLOWING "USE RESTRICTIONS"

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DIMMERS (EOVZ)

DIMMERS, COMMERCIAL (EOXT)

USE

This category covers incandescent and fluorescent commercial dimmers intended for mounting in flush device boxes or on outlet box covers (wall box), unless otherwise stated in the individual certifications. They are intended for control of single- or multi-output lighting circuits. They are intended only for the control of permanently installed luminaires.

RELATED PRODUCTS

Dimmers, Commercial (EOXT)—Continued

Dimmers intended for use in residential applications are covered under Dimmers, General Use Switch (EOYX). Additional special-application dimmers are covered under Dimmers, Theater (EPAR) and Dimmers, Theater, Controls (EPCT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Dimmer."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DIMMERS, GENERAL-USE SWITCH (EOYX)

GENERAL

This category covers dimmers for mounting in flush device boxes or on outlet box covers (wall box), unless otherwise stated in the individual certifications. They are intended only for the control of permanently installed luminaires.

RATINGS

Dimmers are rated maximum 600 V ac (120 V ac for touch dimmers) and are intended for installation on a 20 A or less branch circuit. Dimmers are rated for lamp or lamp control loads from 300 W or 300 VA to a maximum of 2000 W or 2000 VA. They have been investigated for use in nominal 25°C environments, unless otherwise stated in the individual certifications.

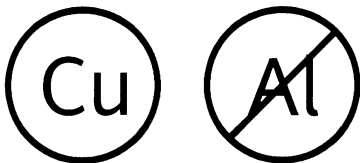
PRODUCT MARKINGS

Dimmers may include one or more of the following installation-related markings:

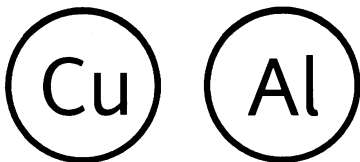
On the dimmer:

"For Control of Permanently Installed _____ Lamp Fixtures Only," or the equivalent. The blank identifies the type of lighting (luminaire) load, such as "Incandescent," "Fluorescent" or "Low Voltage."
 "Use _____ wire only," where the blank indicates "copper" or "CU," "aluminum" or "AL," or both. If symbols are used, they shall be as follows:

For a terminal rated for copper wire only:



For a terminal rated for use with both copper and aluminum wire:



On the dimmer, on a separate instruction sheet packaged with the dimmer, or on the smallest unit packaging provided with the dimmer, the word "CAUTION" followed by one of the statements or equivalent as indicated below based upon the intended load:

For dimmers controlling a ballast — "To Reduce the Risk of Overheating and Possible Damage to Other Equipment, Do Not Install to Control a Receptacle, a Motor-operated Appliance, or a Transformer-supplied Appliance," or

For dimmers controlling a tungsten-filament load — "To Reduce the Risk of Overheating and Possible Damage to Other Equipment, Do Not Install to Control a Receptacle, a Motor-operated Appliance, a

Dimmers, General-use Switch (EOYX)—Continued

Fluorescent Lighting Fixture, or a Transformer-supplied Appliance," or

For dimmers controlling a low-voltage transformer — "To Reduce the Risk of Overheating and Possible Damage to Other Equipment, Do Not Install to Control a Receptacle, or a Motor-operated Appliance"

Additionally, one or more of the following markings may appear on the dimmer, on a separate instruction sheet packaged with the dimmer, or on the smallest unit packaging provided with the dimmer:

"For multiple ganged installations apply derating factor"

"For use with _____," where the blank identifies specific manufacturers and models of electronic ballast, electronic power supply or low-voltage supply.

"For use with magnetic ballast _____," where the blank identifies specific manufacturers and models. If no specific manufacturer or model is specified, the dimmer is rated for control of any magnetic ballast.

"For use with Class 2 supply only"

"For splicing _____ wires, sized _____ AWG, use the provided wire splicing connector. Strip conductors to _____ length" (or equivalent description), where the blanks indicate the number of conductors, maximum size and length of prepared striped conductor, respectively.

"For supply connection, use wires rated minimum 75°C"

RELATED PRODUCTS

Dimmers used for special applications are covered under Dimmers for Commercial Use (EOXT), Dimmers for Theater Use (EPAR) and Controls for Theater Dimming Equipment (EPCT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1472, "Solid-State Dimming Controls."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Dimmer," "Outlet Box Lighting Control" or "Wall Box Dimmer," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DIMMERS, THEATER (EPAR)

USE

This category covers luminaire dimmers intended for use in motion picture and television studios, as well as theaters and similar locations. The dimmers may be intended for portable use, rack mounting, or be suitable for permanent installation. This category also covers theater dimming modules intended for mounting in theater switchboards.

RELATED PRODUCTS

Dimmers not intended for motion picture and television studio or theater stage use are covered under Dimmers, Commercial (EOXT).

Theater switchboards incorporating removable dimming modules are covered under Switchboards, Special Purpose (WFIX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 508, "Industrial Control Equipment," and ANSI/UL 891, "Switchboards."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Theater Dimmer."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Dimmers, Theater, Controls (EPCT)

GENERAL

This category covers control units intended to interface with stage, studio, and theater lighting dimming equipment.

These units may be provided with various user controls. The units are provided with a number of control outputs to operate different types of dimming equipment and associated equipment, such as moving luminaires and special effects equipment. They may be provided with integral computer systems.

OUTPUT CONNECTORS/CIRCUITS

Output circuits intended for local task lighting and the like are Class 2 circuits and are marked "Class 2." All other output circuits, including those associated with the Universal Serial Bus (USB), IEEE 1394 bus, PS/2 connectors, MIDI and DMX512 are limited power circuits supplied by ANSI/UL 60950-1 limited power sources, unless:

the circuits are clearly telecommunication circuits (e.g., RJ series modular jack, 50-pin commercial connectors with insulation piercing terminals). These circuits are limited to telecommunication network voltages (TNV) and are suitable for connection to the telecommunication network and distribution wiring in accordance with Article 800 of ANSI/NFPA 70, "National Electrical Code" (NEC); or the circuits are marked, or otherwise identified in the installation and user instructions with the type of circuit (e.g., Class 1), intended cable type (e.g., DP-2) or specific equipment intended to be interconnected (e.g., mgf/model printer).

Limited power circuits of certified ITE supplied by limited power sources are recognized by Section 725.41(A)(4) of the NEC as being equivalent to Class 2 circuits for purposes of applying Article 725 Class 2 wiring requirements.

ADDITIONAL INFORMATION

For additional information, see Dimmers, Theater (EPAR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 60950-1, "Information Technology Equipment – Safety – Part 1: General Requirements."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Theater Lighting Control Console," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS (EPBU)

USE

This category covers indoor and outdoor use Class 2 power supplies and battery chargers intended for use on alternating-current branch circuits with a maximum potential of 150 V to ground. Products covered are (1) portable and semipermanent-mounted direct-plug-in units provided with 15 A blade configurations for use on nominal 120 or 240 V branch circuits, and (2) cord-and-plug-connected units provided with a 15 or 20 A attachment plug configuration. Units may also be provided with a direct-current input jack for being powered from a vehicle battery adapter or from a data port associated with information technology equipment.

These units utilize an isolating transformer and may incorporate components to provide an alternating- or direct-current output. These products have been investigated only for general use (unless otherwise marked) in unclassified locations. Each output complies with Class 2 voltage, current and volt-ampere limits as specified in ANSI/NFPA 70, "National Electrical Code." Maximum output voltage does not exceed 42.4 V peak for alternating current, 60 V for continuous direct current.

Power supplies identified with an enclosure type designation or as "Rain tight" or "Rainproof" are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Class 2 power units intended for use with specific end-use product types that may involve mechanical hazards (such as gardening appliances or tools) are covered as part of the certified appliance or tool.

PRODUCT MARKINGS

DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS (EPBU)

If indicated for a specific end use in the individual certifications (such as for use with audio, radio, and television-type equipment), the products are so marked and have also been investigated to additional requirements found in the appropriate end-use product standard.

Class 2 power units marked "Backfeed Protected" (or "BFP") or equivalent incorporate integral protection to inhibit backfeed of current from the load during a fault in the output circuit or wiring of the power unit.

RELATED PRODUCTS

Class 2 power units intended for permanent electrical connection to the supply source are covered under Power Supplies, Specialty (QQI) or Transformers, Class 2, Class 3 (XOKV). Class 2 transformers with a cord and plug for connection to the electrical supply are also covered under Transformers, Class 2, Class 3 (XOKV).

Class 2 power units intended for use with medical and dental equipment are covered under Power Supplies for Use in Health Care Facilities (KFCG).

Class 2 power units intended as components of fire-protective signaling systems and burglary-protective signaling systems are covered under their respective categories.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1310, "Class 2 Power Units."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Class 2 Power Supply," "Class 2 Transformer," "Class 2 Power Unit," "Class 2 Battery Charger," or other appropriate product name as shown in the individual Listings. The word "Transformer" may be abbreviated "XFMR," "XFRMR" or "XFORMER."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DISPENSING DEVICES (EPWR)

This category covers dispensing devices intended for flammable and combustible liquids and LP-gas in the liquid stage. Flammable and combustible liquids include the common gasoline and diesel engine fuels and the lighter heating oils.

These devices are intended for use in accordance with the applicable Standards of the National Fire Protection Association, including ANSI/NFPA 30, "Flammable and Combustible Liquids Code," and ANSI/NFPA 58, "Liquefied Petroleum Gas Code."

DISPENSING-DEVICE ACCESSORIES (EQJZ)

Retrofit Assemblies (ERKQ)

USE

This category covers retrofit assemblies, which are field-installed systems intended to convert equipment or conventional power-operated dispensing devices for operations, such as, but not limited to, automatic preset operation, self-service operation or operation for use with vapor recovery or processing systems. Such assemblies converted for self-service operation may also include the control and monitoring devices and their accessories normally associated with self-service dispensing systems. The type of system is indicated in the individual Listings.

These assemblies require special installation precautions and are Listed by Report. Under this form of Listing, a Report is prepared that identifies and describes the complete assembly and includes instructions for proper installation. Copies of the Report are available from the Lister.

ADDITIONAL INFORMATION

For additional information, see Flammable and Combustible Liquids and Gases Equipment (AAPQ).

REQUIREMENTS

The basic standard used to investigate products in this category is one of the following:

UL 87, "Power-Operated Dispensing Devices for Petroleum Products" — For products intended for use with gasoline or gasoline/ethanol blends with nominal ethanol concentrations up to 10 percent (gasohol, E10), diesel fuel, diesel/biodiesel blends with nominal biodiesel concentrations up to 5 percent (B5), kerosene, or fuel oil.

UL 87A, "Outline of Investigation for Power-Operated Dispensing Devices for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol

Retrofit Assemblies (ERKQ)—Continued

nol Concentrations Up to 85 Percent (E0 – E85)” — For products intended for use with gasoline or gasoline/ethanol blends with nominal ethanol concentrations up to 85 percent (E85).

UL 87B, “Outline of Investigation for Power-Operated Dispensing Devices for Diesel Fuel, Biodiesel Fuel, Diesel/Biodiesel Blends with Nominal Biodiesel Concentrations Up to 20 Percent (B20), Kerosene, and Fuel Oil” — For products intended for use with diesel fuel, biodiesel fuel, diesel/biodiesel blends with nominal biodiesel concentrations up to 20 percent (B20), kerosene or fuel oil.

UL 87C, “Outline of Investigation for Power-Operated Dispensing Devices for Diesel Exhaust Fluid” — For products intended for use with diesel exhaust fluid.

UL MARK

The Listing Mark on the major component of the assembly includes the following:

**UNDERWRITERS LABORATORIES INC.
LISTED [PRODUCT NAME*]
WHEN INSTALLED AND USED IN ACCORDANCE WITH
UL REPORT, REFERENCE NO. ____ DATED ____
Control No.**

* SELF-SERVICE RETROFIT ASSEMBLY, AUTOMATIC PRESET RETROFIT ASSEMBLY, VAPOR RECOVERY RETROFIT ASSEMBLY, or other appropriate product name as shown in the individual Listings

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POWER-OPERATED DISPENSING DEVICES (EWFx)

This category covers power-operated dispensing devices intended primarily for dispensing motor fuels or other flammable or combustible liquids at service stations.

They consist of power-operated pumping unit(s) contained in the device or remote from it, strainer(s), metering device(s), valve(s), single or multiple dispensing outlets, etc., with apparatus designed to monitor and control the discharge of liquid. They may comprise complete self-contained units mounted in a suitable pedestal and housing or separate assemblies with controls and other apparatus mounted on a panel or in a pedestal installed remote from pumping unit.

These devices are designed to comply with requirements for installation either inside or outside of buildings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Flammable Liquid Dispensing Devices, Power Operated (EWTv)

USE

This category covers power-operated dispensing devices.

A power-operated dispensing device establishes hazardous locations in and around the product as a result of its design and construction and is not intended to be used in hazardous locations resulting from external factors, such as installation near aboveground tanks, LP gas or CNG dispensers. The dispensing device has Class I, Group D, Division 1 and 2 locations within it but may also contain areas that are nonhazardous because of the dispenser construction. Dispensers with nonhazardous areas within them are not suitable for use in a Division 2 location that is based on external factors. Dispensers suitable for use in Division 2 locations that are based on external factors are marked to identify this use.

These products are intended for installation and use in accordance with ANSI/NFPA 70, “National Electrical Code,” and ANSI/NFPA 30A, “Code for Motor Fuel Dispensing Facilities and Repair Garages.”

These products are intended for use with fuels formulated in accordance with 40CFR80, “Regulation of Fuels and Fuel Additives,” and the following:

- a) Gasoline formulated in accordance with ANSI/ASTM D4814, “Standard Specification for Automotive Spark-Ignition Engine Fuel”
- b) Gasoline/ethanol blends at levels designated as “gasohol” (E10 maximum) formulated in accordance with ANSI/ASTM D4814, when blended with denatured fuel ethanol formulated in accordance with ANSI/ASTM D4806, “Standard Specification for Denatured Fuel

Flammable Liquid Dispensing Devices, Power Operated (EWTv)—Continued

Ethanol for Blending with Gasolines for Use as Automotive Spark-Ignition Engine Fuel”

- c) Gasoline/ethanol blends formulated in accordance with ANSI/ASTM D5798, “Standard Specification for Fuel Ethanol (Ed75 – Ed85) for Automotive Spark-Ignition Engines”
- d) Diesel fuel formulated in accordance with ANSI/ASTM D975, “Standard Specification for Diesel Fuel Oils”
- e) Heating fuels formulated in accordance with ANSI/ASTM D396, “Standard Specification for Fuel Oils,” and ANSI/ASTM D3699, “Standard Specification for Kerosine”

ADDITIONAL INFORMATION

For additional information, see Power-operated Dispensing Devices (EWFx) and Flammable and Combustible Liquids and Gases Equipment (AAPQ).

REQUIREMENTS

The basic standard used to investigate products in this category is one of the following:

UL 87, “Power-Operated Dispensing Devices for Petroleum Products” — For products intended for use with gasoline or gasoline/ethanol blends with nominal ethanol concentrations up to 10 percent (gasohol, E10), diesel fuel, diesel/biodiesel blends with nominal biodiesel concentrations up to 5 percent (B5), kerosene, or fuel oil.

UL 87A, “Outline of Investigation for Power-Operated Dispensing Devices for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations Up to 85 Percent (E0 – E85)” — For products intended for use with gasoline or gasoline/ethanol blends with nominal ethanol concentrations up to 85 percent (E85).

UL 87B, “Outline of Investigation for Power-Operated Dispensing Devices for Diesel Fuel, Biodiesel Fuel, Diesel/Biodiesel Blends with Nominal Biodiesel Concentrations Up to 20 Percent (B20), Kerosene, and Fuel Oil” — For products intended for use with diesel fuel, biodiesel fuel, diesel/biodiesel blends with nominal biodiesel concentrations up to 20 percent (B20), kerosene or fuel oil.

UL 87C, “Outline of Investigation for Power-Operated Dispensing Devices for Diesel Exhaust Fluid” — For products intended for use with diesel exhaust fluid.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Power-operated Dispensing Device for Flammable Liquids” or “Power-operated Dispensing Device for Flammable Liquids for Use in Class I, Group D, Division 2 Hazardous Locations.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LP-gas Dispensing Devices, Power Operated (EXHT)

USE

This category covers power-operated dispensing devices intended to be installed outside of buildings and used at service stations for dispensing liquefied petroleum gas as an engine fuel. These products are intended for installation and use in accordance with ANSI/NFPA 58, “Liquefied Petroleum Gas Code,” and ANSI/NFPA 70, “National Electrical Code.”

ADDITIONAL INFORMATION

For additional information, see Power-operated Dispensing Devices (EWFx) and Flammable and Combustible Liquids and Gases Equipment (AAPQ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 495, “Power-Operated Dispensing Devices for LP-Gas.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Power-operated Dispensing Device for LP-Gas.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

LP-gas Dispensing Devices, Power Operated (EXHT)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DISTRIBUTED GENERATION POWER SYSTEMS EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FCHD)

PHOTOVOLTAIC CHARGE CONTROLLERS FOR USE IN HAZARDOUS LOCATIONS (FCJC)

USE AND INSTALLATION

This category covers permanently connected photovoltaic charge controllers that control the state of charge of storage batteries used in photovoltaic power systems.

Photovoltaic charge controllers are rated 600 V dc or less and are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," including Article 690.

These products include photovoltaic charge controller subassemblies for field installation in a specific terminal compartment in accordance with the instructions supplied with the subassembly. The markings identify the modules in which the subassemblies may be installed or the electrical rating parameters (e.g., V_{oc} and I_{sc}) of the modules with which they are to be used. The terminal compartments, modules and subassemblies are products of the same manufacturer.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 1741, "Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photovoltaic Charge Controller for Use in Hazardous Locations" or "Photovoltaic Charge Controller Subassembly for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PHOTOVOLTAIC MODULES AND PANELS FOR USE IN HAZARDOUS LOCATIONS (FCJU)

USE AND INSTALLATION

This category covers flat-plate photovoltaic modules and panels intended for mounting on buildings or on ground-supported frames.

Roof-mounted modules and panels are investigated for one of three mounting methods: (1) integral to the roof of a building, (2) directly on a building's roof, or (3) on a rack with a space above the roof surface.

When mounted integral to a building's roof the module serves as the waterproof membrane. Direct-mounted panels are placed upon the building's waterproof membrane (shingles or the like). Rack-mounted styles are spaced away from the building's roof member. Rack-mounted styles may also be installed separate from buildings.

Installation of modules on or integral to a building's roof system may adversely affect the roof-covering materials' resistance to external fire exposure if the module has a lesser or no fire-resistance rating. Roof-covering materials will not be adversely affected when the modules have an equal or greater fire-resistance rating than the roof-covering material.

Photovoltaic modules and panels are intended to be connected to electrical loads, controllers, or to static inverters that convert the dc power the modules and panels generate to other types of power compatible with the

Photovoltaic Modules and Panels for Use in Hazardous Locations (FCJU)—Continued

intended loads. In addition to their voltage, current and power ratings, modules and panels are marked to indicate terminal polarity, maximum series overcurrent device rating, and minimum acceptable diode bypassing (if needed). Installation of the modules and panels, including connection between the modules and the panels and the load, static inverters or controller is intended to be in accordance with ANSI/NFPA 70, "National Electrical Code." Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes including the class of roof covering.

FLAME CLASSES

When applicable, modules and panels are marked "Class A," "Class B" or "Class C" to denote their resistance to external fire exposure. Modules and panels that have not been identified with respect to their resistance to external fire exposure are marked "Not Fire Rated." For significance of external fire exposure classes, see Roof-covering Materials (TEVT) and Roofing Systems (TGFU).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 1703, "Flat-Plate Photovoltaic Modules and Panels."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

ADJUNCT SERVICE

UL provides a service for the certification of photovoltaic modules and panels that not only meet the appropriate requirements of UL but also have been investigated in accordance with one or more of the following design qualification standards:

1. IEEE 1262-(issue date), "IEEE Recommended Practice for Qualification of Photovoltaic (PV) Modules"
2. IEC 61215-(issue date), "Crystalline Silicon Terrestrial Photovoltaic Modules - Design Qualification and Type Approval"
3. IEC 61646-(issue date), "Thin-Film Terrestrial Photovoltaic Modules - Design Qualification and Approval"

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photovoltaic Module for Use in Hazardous Locations" or "Photovoltaic Panel for Use in Hazardous Locations."

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with IEC or IEEE design qualification standards. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following marking: "ALSO CLASSIFIED IN ACCORDANCE WITH *," where "*" is one or more of the following:

1. IEEE 1262-(issue date)
2. IEC 61215:(issue date)
3. IEC 61646:(issue date)

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DOOR OPERATORS FOR USE IN HAZARDOUS LOCATIONS (FCQU)

GENERAL

This category covers door operators for fire doors intended for installation in accordance with ANSI/NFPA 80, "Fire Doors and Other Opening Protections."

They are intended for single-slide and center-parting level and inclined-track fire doors. These devices consist of an electric-powered operator that opens and closes the door during normal usage and a mechanical release which, under fire conditions, disconnects the door from the powered operator and permits it to close by either a certified sliding-door closer or a system of suspended weights.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

DOOR OPERATORS FOR USE IN HAZARDOUS LOCATIONS (FCQU)

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 325, "Door, Drapery, Gate, Louver, and Window Operators and Systems."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Door Operator for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DOOR, DRAPERY, GATE, LOUVER, AND WINDOW OPERATORS AND SYSTEMS (FDDR)

GENERAL

This category covers electrical and pneumatic door and gate systems, and door, drapery, gate, louver, window and turnstile operators, together with controls and accessories for use with such operators, and similar devices.

This category covers door operators that have been investigated from an electrical and casualty viewpoint only. For door operators that have been additionally investigated for use on fire doors, see Fire Door Closers, Holders and Operators (GTBT).

This category does not cover the glass portions of the partitions, panels, or sections, associated with the operators and/or controls, unless indicated in the individual certifications.

Door and gate systems include doors or gates, operators and controls, tested as complete units. Components of a system are specifically designated in the installation instructions provided with the system.

Residential door operators are intended for intermittent use on counter-balanced doors, usually of the overhead type, in residential buildings of one to four single-family occupancies. When provided, external entrapment-protection devices, such as photoelectric sensors or door-edge sensors, should be installed in accordance with the installation instructions provided. In addition, all installation instructions, including the installation of warning labels adjacent to the wall-mounted actuating switch, should be followed.

Accessories for residential garage door operators, such as external entrapment-protection devices, should be installed and used only on door operators for which they are intended as marked on the installation instructions and/or packaging.

Commercial and industrial door operators are not intended to be installed in applications where the load exceeds the maximum power in foot-pounds per second or the maximum pull in pounds marked on the appliance. Light-duty, commercial vehicular door or door operators are not intended to be installed in locations where the number of operations per hour exceed that marked on the appliance.

Operators intended for use with other than counter-balanced types of doors, gates or windows are tested in conjunction with the doors, gates or windows for which they are designed.

Residential drapery operators are intended for intermittent use, controlling a maximum drapery weight of one pound per foot, unless otherwise marked.

Commercial drapery operators are intended for intermittent use, controlling drapery of the maximum weight marked on the assembly.

Vehicular gate and vehicular barrier operators have been investigated for use in one or more of the following usage applications. The classes for which they have been investigated are permanently marked on each operator.

CLASS I — A vehicular gate operator (or system) intended for use in a home of one to four single-family dwellings, or an associated garage or parking area.

CLASS II — A vehicular gate operator (or system) intended for use in a commercial location or building, such as a multifamily housing unit (five or more single-family units), hotel, garage, retail store, or other building servicing the general public.

CLASS III — A vehicular gate operator (or system) intended for use in an industrial location or building, such as a factory or loading

DOOR, DRAPERY, GATE, LOUVER, AND WINDOW OPERATORS AND SYSTEMS (FDDR)

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dock area, or other location not intended to service the general public.

CLASS IV — A vehicular gate operator (or system) intended for use in a guarded industrial location or building, such as an airport security area or other restricted access location not servicing the general public, in which unauthorized access is prevented via supervision by security personnel.

It has been determined that the casualty hazards inherent in the products covered under this category have been reduced to an acceptable degree; however, the ultimate safety is dependent upon proper installation. Authorities Having Jurisdiction should be consulted prior to installation. Installation should be performed by a qualified installer using the manufacturer's instructions. Special care should be exercised during installation of all operators to ensure that recommended safety devices, such as photoelectric sensors or reversing-edge switches, are properly installed. When so marked, industrial door operators should be mounted a minimum of 8 ft (2.44 m) above the floor.

RELATED PRODUCTS

This category does not cover door operators incorporated as integral parts of walk-in panel units for use with refrigerator cooler installations; see Door Panel Assemblies (FDIT).

This category does not cover door or gate systems or other assemblies including break-out or hinged sections intended to facilitate safe egress of persons in case of emergency; see Exit Doors (FUXV), Panic Hardware (FVSR), Fire Door Closers, Holders and Operators (GTBT) and Fire Door Operators with Automatic Closers (GUJY).

This category does not cover the burglary- and theft-protection features of vault doors or burglary-resistant, electrically operated door mechanisms intended to control the opening and closing of cell doors in a prison or institution; see Burglary-resistant, Electrically Operated Door-locking Mechanisms (CVX) and Vault Doors, Burglary Resistant (YUSR).

This category does not cover industrial control panels used for motor-control functions; see Motor Controllers, Magnetic (NLDX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category, except turnstile operators, is ANSI/UL 325, "Door, Drapery, Gate, Louver, and Window Operators and Systems."

The basic requirements used to investigate turnstile operators in this category are contained in UL Subject 2593, "Outline of Investigation for Motor Driven Turnstile Operators and Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Door Operator," "Gate Operator," "Drapery Operator," "Window Operator," "Louver Operator," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DOOR HOLDERS FOR USE IN HAZARDOUS LOCATIONS (FDGF)

GENERAL

This category covers door holders for fire doors intended for installation in accordance with ANSI/NFPA 80, "Fire Doors and Other Opening Protectives."

They are intended for use with swinging, sliding or rolling fire doors, as indicated in the individual certifications, and are designed to hold doors in the open position under normal usage and release the doors under fire conditions. They are intended to be used with a suitable door closer and automatic operating devices or systems.

Authorities Having Jurisdiction should be consulted to determine the acceptability of the door, door holders, door closer and automatic operating device or other combination of system units for any given location.

RELATED PRODUCTS

Automatic operating devices or systems consist of releasing devices of heat detectors for releasing device service and are covered under Heat Detectors for Releasing Device Service for Use in Hazardous Locations (TBGR).

For information on door closers, see Fire Door Accessories (GVUW) and Fire Door Closers, Holders and Operators (GTBT).

DOOR HOLDERS FOR USE IN HAZARDOUS LOCATIONS (FDGF)

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ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 228, "Door Closers-Holders, With or Without Integral Smoke Detectors."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Door Holder for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DOOR PANEL ASSEMBLIES (FDIT)

GENERAL

This category covers "walk-in" and "reach-in" door panel assemblies and related auxiliary devices intended for use with environmental, freezer or cooler rooms and cabinets.

The equipment is intended for permanent connection to alternating-current circuits rated at not more than 600 V.

Panel assemblies and auxiliary devices are provided with an electrical system which serves to provide one or more of the following functions: illumination, prevention of ice formation, prevention of condensation, motor drives for opening and closing doors, etc.

Door panel assemblies consist of the door and/or the door frame.

Auxiliary devices consist of equipment other than door panel assemblies associated with the foregoing apparatus or functions, including insulated panels with electrical components.

Door panel assemblies identified with an enclosure type designation or as "Rain tight" or "Rainproof" are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

RELATED PRODUCTS

Refrigerated cabinets and cases are covered under Commercial Refrigerators and Freezers (SGKW). Nonelectrical insulated wall panels are covered under Building Units (BLBT). Refrigeration units are covered under Units, Refrigerating (SPYZ).

Factory-assembled walk-in refrigerators and freezers are covered under Walk-in Units, Commercial (SQTV)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 471, "Commercial Refrigerators and Freezers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Door Panel Assembly" or "Auxiliary Insulated Panel."

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DRILLING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (FDJJ)

This category covers products specifically intended for installation on oil rigs and drilling platforms.

DRILLING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (FDJJ)

DRILLING INSTRUMENTATION FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (FDJN)

USE AND INSTALLATION

This category covers drilling equipment consisting of instruments, sensors and transducers intended to measure, record and monitor drilling variables and to control the drilling process.

These products have been investigated for potential conformity to the installation and use provisions of ANSI/NFPA 70, "National Electrical Code," or United States Coast Guard Electrical Engineering Regulations 46CFR110, "General Provisions," 46CFR111, "Electrical Systems - General Requirements," 46CFR112, "Emergency Lighting and Power Systems," and 46CFR113, "Communication and Alarm Systems and Equipment."

Intrinsically safe circuits and equipment are intended to be installed and interconnected in accordance with the instructions provided.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 61010C-1, "Process Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Drilling Instrumentation for Use in Hazardous Locations" or "Drilling Instrumentation (Associated Apparatus)," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MARINE SHIPBOARD CABLE FITTINGS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (FDJR)

USE

This category covers cable termination fittings and combination cable termination and sealing fittings for threaded connection of marine shipboard cable to equipment. The termination and sealing fittings are intended for use only with the sealing compound as specified by the manufacturer in instructions furnished with the fittings. No splices of conductors are intended to be made in the fitting. Restrictions on application, position and/or location of the fitting are indicated in the manufacturer's instructions.

These fittings are intended for use on mobile offshore oil rigs and drilling platforms. The investigation of these fittings includes an evaluation for conformity to the installation and use provisions of United States Coast Guard (USCG) Electrical Engineering Regulations 46CFR110, "General Provisions," 46CFR111, "Electrical Systems - General Requirements," 46CFR112, "Emergency Lighting and Power Systems," and 46CFR113, "Communication and Alarm Systems and Equipment," as applied by the Authority Having Jurisdiction.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 2225, "Cables and Cable Fittings for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Marine Shipboard Cable Fitting for Use in Hazardous Locations" or "Marine Shipboard Cable Sealing Fitting for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

DRILLING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (FDJJ)

Marine Shipboard Cable Fittings for Use in Zone Classified Hazardous Locations (FDJR)—Continued

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DRILLING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FDJZ)

This category covers products specifically intended for installation on oil rigs and drilling platforms.

DRILLING INSTRUMENTATION FOR USE IN HAZARDOUS LOCATIONS (FDKX)

USE AND INSTALLATION

This category covers drilling equipment consisting of instruments, sensors and transducers intended to measure, record and monitor drilling variables and to control the drilling process.

These products have been investigated for potential conformity to the installation and use provisions of ANSI/NFPA 70, "National Electrical Code," or United States Coast Guard Electrical Engineering Regulations, Subchapter J, (Title 46CFR (Parts 110-113 inclusive), "Electrical Engineering."

Intrinsically safe circuits and equipment are intended to be installed and interconnected in accordance with the instructions provided.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 61010C-1, "Process Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Drilling Instrumentation for Hazardous Locations" or "Drilling Instrumentation (Associated Apparatus)," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MARINE SHIPBOARD CABLE SEALING FITTINGS FOR USE IN HAZARDOUS LOCATIONS (FDLW)

USE

This category covers combination termination and sealing fittings for threaded connection of marine shipboard cable to equipment in hazardous locations. They are intended for use only with the sealing compound specified by the manufacturer in instructions furnished with the fittings. No splices of conductors are permitted to be made in the fitting. Restrictions on application, position, and/or location of the sealing fitting are indicated in the manufacturer's instructions.

These fittings are intended for use on mobile offshore oil rigs and drilling platforms. The investigation of these fittings includes an evaluation for conformity to the installation and use provisions of United States Coast Guard Electrical Engineering Regulations 46CFR110, "General Provisions," 46CFR111, "Electrical Systems - General Requirements," 46CFR112, "Emergency Lighting and Power Systems," and 46CFR113, "Communication and Alarm Systems and Equipment," as applied by the Authority Having Jurisdiction.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

DRILLING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FDJZ)

Marine Shipboard Cable Sealing Fittings for Use in Hazardous Locations (FDLW)—Continued

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 2225, "Cables and Cable Fittings for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Marine Shipboard Cable Sealing Fitting for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EARTHQUAKE-ACTUATED EQUIPMENT (FFPC)

USE AND INSTALLATION

This category covers products with earthquake-sensing means that shut off gas flow or disconnect an electrical load from its source in the event of a seismic disturbance.

Earthquake-actuated gas-shutoff valves are intended for stationary installation and marked with the specific fluids, fluid temperature, ambient temperature and operating pressure.

Earthquake-actuated electrical switches are intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code."

RELATED PRODUCTS

See Earthquake-actuated Shutoff Systems (FFPH).

ADDITIONAL INFORMATION

For additional information, see Flammable and Combustible Liquids and Gases Equipment (AAPQ), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate earthquake-actuated gas-shutoff valves in this category is ANSI Z21.70 (1981), "Earthquake Actuated Automatic Gas Shutoff Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Services. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, one of the following product names as appropriate: "Earthquake Actuated Gas Shutoff System," "Earthquake Actuated Gas Shutoff Valve," "Earthquake Actuated Electrical Switch" or other appropriate product name as shown in the individual Listings, and "IN ACCORDANCE WITH ANSI Z21.70, Earthquake Actuated Automatic Gas Shutoff Systems."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EARTHQUAKE-ACTUATED SHUTOFF SYSTEMS (FFPH)

USE AND INSTALLATION

This category covers products with earthquake-sensing means that shut off gas flow or disconnect an electrical load from its source in the event of a seismic disturbance.

Earthquake-actuated gas-shutoff valves are intended for stationary installation and marked with the specific fluids, fluid temperature, ambient temperature and operating pressure.

Earthquake-actuated electrical switches are intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code."

RELATED PRODUCTS

See Earthquake-actuated Equipment (FFPC).

ADDITIONAL INFORMATION

For additional information, see Flammable and Combustible Liquids and Gases Equipment (AAPQ), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate earthquake-actuated gas-shutoff valves in this category is ASCE 25 (1997), "Earthquake-Actuated Automatic Gas Shutoff Devices."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, one of the following product names, as appropriate: "Earthquake Actuated Gas Shutoff System," "Earthquake Actuated Gas Shutoff Valve," "Earthquake Actuated Electrical Switch" or other appropriate product name as shown in the individual Listings, and "IN ACCORDANCE WITH ASCE 25, Earthquake-Actuated Automatic Gas Shutoff Devices."

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ELECTRIC VEHICLE SYSTEMS (FFQM)

USE

This category covers products and systems intended for use with or installation on automotive type vehicles for highway use, such as passenger automobiles, buses, trucks, vans, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery. Battery charging equipment can be supplied by a utility source, a fuel cell, photovoltaic array, or other source of power.

UNEVALUATED FACTORS

The physiological effects of chemical substances or gases associated with the recharging of storage batteries have not been investigated.

ELECTRIC VEHICLE CABLE (FFSO)

GENERAL

This category covers electric vehicle cable constructed as described in, and certified for use in accordance with Article 400 of ANSI/NFPA 70, "National Electrical Code." Electric vehicle cable consists of two or more insulated conductors, with or without grounding conductors, with an overall jacket. The insulation and jacket are both thermoset on Types EVJ and EV, thermoplastic elastomer (TPE) on Types EVJE and EVE, and thermoplastic (PVC) on Types EVJT and EVT.

The cable is used to supply power, signal, and control to electric vehicles during the charging process. It is rated 60 to 105°C (140 to 221°F) dry; 60°C (140°F) wet; 60°C (140°F) where exposed to oil, and for use where exposed to the direct rays of the sun. For cable so marked, a gasoline-immersion rating is also assigned. The term "wet" indicates that the cable is acceptable for immersion in water. Electric vehicle cable employs flexible stranded copper conductors in a size range of 18 AWG to 500 kcmil.

Type EVJ — Rated 300 V, contains two to six 18-12 AWG thermoset-insulated circuit conductors, and may employ one or more insulated grounding conductors. The cable may contain hybrid data, signal, communications, and/or optical fiber cable in any AWG size.

Type EVJE — Rated 300 V, same as Type EVJ except that the cable employs thermoplastic-elastomer-insulated conductors and jacket.

Type EVJT — Rated 300 V, same as Type EVJ except that the cable employs thermoplastic (PVC) insulated conductors.

Type EV — Rated 600 V, contains two or more 18 AWG to 500 kcmil thermoset-insulated circuit conductors, and may employ one or more insulated grounding conductors. The cable may contain hybrid data, signal, communications, and/or optical fiber cable in any AWG size.

Type EVE — Rated 600 V, same as Type EV except that the cable employs thermoplastic-elastomer-insulated conductors.

Type EVT — Rated 600 V, same as Type EV except that the cable employs thermoplastic (PVC).

ADDITIONAL INFORMATION

For additional information, see Electric Vehicle Systems (FFQM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 62, "Flexible Cords and Cables."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is

Electric Vehicle Cable (FFSO)—Continued

packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Vehicle Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRIC VEHICLE CHARGING SYSTEM EQUIPMENT (FFTG)

USE AND INSTALLATION

This category covers charging system equipment, either conductive or inductive, intended for use with electric vehicles. The equipment can be located on or off board the vehicle. Off-board equipment is intended for indoor or outdoor use.

This equipment is rated 600 V or less. The equipment is intended to be connected to the vehicle by means of a flexible cord and an electric vehicle connector, and intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

Portable type equipment with parts that are considered arcing or sparking, such as switches, relays, etc., are marked with the word "WARNING" and the following or equivalent: "This equipment employs parts, such as switches and relays, that tend to produce arcs or sparks and therefore, when used in a garage, locate in a room or enclosure provided for the purpose or not less than 18 inches (457.2 mm) above the floor."

RELATED PRODUCTS

See Battery Chargers, Automotive Type (BBGQ).

ADDITIONAL INFORMATION

For additional information, see Electric Vehicle Systems (FFQM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2202, "Electric Vehicle (EV) Charging System Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Charging System Equipment," "Battery Charger," "Charge Port," "Charge Controller," or other appropriate product name as shown in the individual Listings, preceded by "Electric Vehicle" (or "EV").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (FFWA)

USE

This category covers electric vehicle supply equipment rated 250 V ac or less, intended for indoor or outdoor use where power is required for the recharging of electric vehicle storage batteries. These products are intended to provide power to an on-board charger. These products include electric vehicle charging stations, electric vehicle power outlets and electric vehicle cord sets for use with electric vehicles in accordance with Article 625 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Electric vehicle cord sets are rated a maximum of 125 V ac, 20 A, such that they can be cord-connected devices and used outdoors in accordance with Article 625 of the NEC. All other cord-connected products covered under this category are intended for indoor use only. Permanently-connected products may be used either indoors or outdoors as indicated. All products are provided with a marking indicating the enclosure type rating, which corresponds to the indoor or outdoor use of the product.

Products covered under this category are marked to indicate that they are for use with electric vehicles. The products contain personnel protection equipment in accordance with UL 2231-1, "Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements," and UL 2231-2, "Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems."

Electric Vehicle Supply Equipment (FFWA)—Continued

RELATED PRODUCTS

Electric vehicle charging equipment with a dc output voltage rated up to 600 V dc is covered under Electric Vehicle Charging System Equipment (FFTG).

ADDITIONAL INFORMATION

For additional information, see Electric Vehicle Systems (FFQM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2594, "Outline of Investigation for Electric Vehicle Supply Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Vehicle Power Outlet" (or "EV Power Outlet"), "Electric Vehicle Charging Station" (or "EV Charging Station") or "Electric Vehicle Cord Set" (or "EV Cord Set").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ON-BOARD ELECTRIC VEHICLE EQUIPMENT (FFZA)

ELECTRIC VEHICLE BATTERY PACKS (FFRW)

USE AND INSTALLATION

This category covers battery packs investigated in accordance with Article 625 of ANSI/NFPA 70, "National Electrical Code" (NEC), to determine whether or not a forced-air ventilation system is required when a particular electric vehicle battery pack is charged using the specified charging system of the electric vehicle.

REBUILT PRODUCTS

This category also covers electric vehicle battery packs that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt electric vehicle battery packs are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt electric vehicle battery packs are subject to the same requirements as new electric vehicle battery packs.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Electric vehicle battery packs employing non-vented batteries or batteries whose chemistry cannot produce hydrogen are investigated by inspection of the manufacturer's product.

Electric vehicle battery packs employing batteries that can emit hydrogen, such as valve regulated or vented lead-acid or nickel-metal hydride batteries, are subjected to investigation in accordance with SAE Recommended Practice J1718 (1994), "Measurement of Hydrogen Gas Emission From Battery-Powered Cars and Light Trucks During Battery Charging." Battery systems which do not produce hydrogen concentrations in excess of 1% (25% of the lower flammability limit) are considered in compliance with the requirements of Article 625 of the NEC.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

ELECTRIC VEHICLE BATTERY PACK

FOR CHARGING INDOORS WITHOUT MECHANICAL BUILDING VENTILATION IN [COMPANY NAME] ELECTRIC VEHICLE [MODEL NAME]

Control No.

For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Electric Vehicle Battery Packs (FFRW)—Continued

urer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRACTION MOTORS (FFWT)

USE AND INSTALLATION

This category covers motors intended as the prime mover and installed in or on vehicles for highway use, such as passenger automobiles, buses, trucks, vans, bicycles, motorcycles and the like.

These motors have been investigated for construction and operation at rated output. They have additionally been investigated for the severity and profile of shock and vibration likely to be encountered by motors mounted in road vehicles.

This information, together with other conditions of use, such as mounting position, are marked on the product and/or detailed in the manufacturer's installation instructions furnished with the product.

RELATED PRODUCTS

See:

- Electric Vehicle Battery Packs (FFRW)
- Electric Vehicle Cable (FFSO)
- Electric Vehicle Charging System Equipment (FFTG)
- Electric Vehicle Supply Equipment (FFWA)
- Power Converters/Inverters for Use in Electric Land Vehicles (FFZS)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1004-1, "Rotating Electrical Machines - General Requirements."

Where indicated in the individual Classifications, the spacings provided within these motors have additionally been investigated to ANSI/UL 840, "Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

TRACTION MOTOR

AS TO CONSTRUCTION AND OPERATION AT RATED OUTPUT
Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

POWER CONVERTERS/INVERTERS FOR USE IN ELECTRIC LAND VEHICLES (FFZS)

USE AND INSTALLATION

This category covers power converters and power inverters intended for use in electric vehicles.

An electric vehicle is defined as an automotive-type vehicle for over-the-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and the like, primarily powered by a combustion engine, an electric motor, or both, and draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current.

This category covers fixed and stationary power converters having a nominal rating of 1000 V or less, direct or alternating current. This category also covers fixed, stationary and portable power inverters having a dc input and a 120 or 240 V ac output. These converters/inverters are intended for use within electric land vehicles where not directly exposed to outdoor conditions.

This category also covers converters/inverters that are additionally intended to charge batteries.

RELATED PRODUCTS

- See Electric Vehicle Battery Packs (FFRW) and Traction Motors (FFWT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 458A, "Outline of Investigation for Power Converters/Inverters for Electric Land Vehicles."

Power Converters/Inverters for Use in Electric Land Vehicles (FFZS)—Continued

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Vehicle Power Converter" or "Electric Vehicle Power Inverter." The term "Electric Vehicle" may be abbreviated "EV."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRICAL AND ELECTRONIC MEASURING AND TESTING EQUIPMENT (FHCW)

GENERAL

This category covers equipment intended primarily for the metering and testing of electrical and electronic circuits such as ammeters, voltmeters, power meters, frequency counters, chart recorders, oscilloscopes, etc. This category also covers equipment designed to provide electrical or electronic signals for test purposes, such as signal generators or injectors, frequency synthesizers, etc.

These products have been investigated with respect to risk of fire, electric shock, and personal injury.

This category does not cover medical and dental or process control metering and testing equipment.

FACTORS NOT INVESTIGATED

The accuracy of the equipment has not been investigated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1244, "Electrical and Electronic Measuring and Testing Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrical and Electronic Measuring and Testing Equipment," or the name of the specific type of product as shown in the individual Listings, or combinations of the preceding identities.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRICAL CIRCUIT INTEGRITY SYSTEMS (FHIT)

GENERAL

This category covers electrical circuit integrity systems consisting of components and materials intended for installation as protection for specific electrical wiring systems, with respect to the disruption of electrical circuit integrity upon exterior fire exposure.

Ratings apply only to the entire system assembly, constructed using the combination of components and materials specified in the individual system. Components and materials are designated for use in a specific individual system for which corresponding ratings have been developed, and are not intended to be interchanged between systems. Ratings are not assigned to individual system components or materials.

Electrical circuit integrity systems are intended to be fastened to a concrete or masonry wall or a concrete floor-ceiling assembly. The fire rating of the wall or floor-ceiling assembly is intended to be equal to or greater than the rating of the electrical circuit integrity system. This is to ensure that the complete electrical circuit integrity system will survive during fire and hose stream exposure.

SYSTEMS INCORPORATING CABLE PROTECTED WITH ELECTRICAL CIRCUIT PROTECTIVE MATERIALS

These electrical circuit integrity systems are investigated with respect to fire exposure and water hose stream performance. Performance criteria are based on temperatures within the enclosure and visual examination after the water hose stream.

These systems are intended to be installed in interior environments with representative heating and air conditioning, unless stated otherwise in the individual system.

Where indicated in the system, the ampacity reduction due to the electrical circuit protection system has been determined for normal ambient temperature operating conditions in accordance with IEEE 848 (1996), "IEEE Standard Procedure for the Determination of the Ampacity Derating of Fire-Protected Cables." If not specified in the system, the effect of the electrical circuit protection system on the ampacity of the electrical conductors has not been investigated. The specifications for the system and its assembly are important details in the development of the ratings. Information concerning these details is described in each system.

The products used in these systems are intended to be installed in accordance with all the provisions of ANSI/NFPA 70, "National Electrical Code" (NEC), and as amended by the details of each individual systems (such as type of supports) and the accompanying instructions.

Authorities Having Jurisdiction should be consulted as to the specific requirements covering the installation and use of these systems.

SYSTEMS CONSTRUCTED WITH FIRE-RESISTIVE CABLE

These electrical circuit integrity systems are investigated with respect to fire exposure and water hose stream performance. Performance criteria are based on functionality of the cable during the fire and after the water hose stream.

These systems are intended to be installed in accordance with all provisions of the NEC and as amended by the details of each individual system (such as type of supports) and the accompanying instructions.

Authorities Having Jurisdiction should be consulted as to the specific requirements covering the installation and use of these systems.

RELATED PRODUCTS

See Electrical Circuit Protective Materials (FHIY).

See Fire-resistive Cable (FHJR).

ADDITIONAL INFORMATION

For additional information, see Fire-resistance Ratings (BXRH).

REQUIREMENTS

The basic requirements used to investigate systems incorporating cable protected with electrical circuit protective materials in this category are contained in UL Subject 1724, "Outline of Investigation for Fire Tests for Electrical Circuit Protective Systems."

The basic standard used to investigate systems constructed with fire-resistive cable in this category is ANSI/UL 2196, "Tests for Fire Resistive Cables."

UL MARK

System components identified by an (*) in the description text are Classified under the Classification and Follow-Up Service of UL. Such components and names of manufacturers who are authorized to apply the Classification Mark are identified under the specific product category.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRICAL CIRCUIT PROTECTIVE MATERIALS (FHIY)

GENERAL

This category covers electrical circuit protective materials of proprietary composition, intended for installation in accordance with the application instructions provided with the product and as specified on the design card for an individual electrical circuit protective system. Properties of these materials, other than the degree of fire resistance provided to specific electrical wiring systems, have not been investigated.

Authorities Having Jurisdiction should be consulted before installation.

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1724, "Outline of Investigation for Fire Tests for Electrical Circuit Protective Systems."

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

Electrical Circuit Protective Materials (FHIY)—Continued

**ELECTRICAL CIRCUIT PROTECTIVE MATERIALS
FOR USE IN ELECTRICAL CIRCUIT PROTECTIVE SYSTEMS
SYSTEM NO. _____
SEE UL BUILDING MATERIALS DIRECTORY
Control No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FIRE-RESISTIVE CABLE (FHJR)

USE AND INSTALLATION

This category covers fire-resistive cable, which is insulated electrical cable intended for installation as specified in the individual electrical circuit integrity systems. This cable has been investigated for its ability to remain electrically functional during a fire exposure and after the impact, erosion and cooling effect of a water hose stream test. There are two hose stream levels: low impact and normal impact. The low-impact fog nozzle hose stream is applied only to cable marked with the “-CI” suffix. The normal-impact hose stream, applied with a standard-taper, smooth-bore playpipe, is applied to all other types of cable.

There are two fire exposure conditions: normal temperature rise (same as ANSI/UL 2196, “Tests for Fire Resistive Cables”) and rapid temperature rise (to ANSI/UL 1709, “Rapid Rise Fire Tests of Protection Materials for Structural Steel”). If not stated otherwise in the individual Classifications, the normal temperature rise exposure was used.

This cable is required to comply with national requirements for electrical safety in addition to requirements related to its continued operation under fire exposure.

The cable as used in the specified systems has been investigated and found to comply with applicable electrical requirements.

The cable is intended to be installed in accordance with the provisions of ANSI/NFPA 70, “National Electrical Code,” where indicated in the system, and the manufacturer’s installation instructions.

Authorities Having Jurisdiction should be consulted before installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Circuit Integrity Systems (FHIT) and Fire-resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2196, “Tests for Fire Resistive Cables,” or ANSI/UL 1709, “Rapid Rise Fire Tests of Protection Materials for Structural Steel.”

Data concerning the insulation resistance and leakage-current performance of the electrical cable during tests conducted in accordance with ANSI/UL 2196 are contained in the test report. Test reports are available from the Classified company.

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**FIRE-RESISTIVE CABLE
FOR USE IN ELECTRICAL CIRCUIT INTEGRITY SYSTEMS
SYSTEM NO. _____
SEE UL FIRE RESISTANCE DIRECTORY
Control No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRICAL METALLIC TUBING (FJMX)

GENERAL

This category covers electrical metallic tubing (EMT), including lengths of straight tubing and elbows, with or without integral couplings or other integral fittings, manufactured in trade sizes 1/2 to 4 (metric designators 16 to 103) inclusive. EMT is for installation of conductors in circuits rated above or below 600 V, nominal, and in accordance with Article 358 of

ANSI/NFPA 70, “National Electrical Code” (NEC). This tubing is intended for installation and use in accordance with the following information.

Galvanized steel EMT installed in concrete on grade or above generally requires no supplementary corrosion protection. Galvanized steel EMT in concrete slab below grade level may require supplementary corrosion protection.

In general, galvanized steel EMT in contact with soil requires supplementary corrosion protection. Where galvanized steel EMT without supplementary corrosion protection extends directly from concrete encasement to soil burial, severe corrosive effects are likely to occur on the metal in contact with the soil.

Galvanized steel EMT that is provided with a metallic or nonmetallic coating, or a combination of both, has been investigated for resistance to atmospheric corrosion. Nonmetallic outer coatings that are part of the required resistance to corrosion have been additionally investigated for resistance to the effects of sunlight.

Nonmetallic outer coatings of greater than 0.010-in. thickness are investigated with respect to flame propagation detrimental effects to any underlying corrosion protection, the fit of fittings, and electrical continuity of the connection of tubing to fittings.

Galvanized steel EMT with nonmetallic coatings has not been investigated for use in ducts, plenums, or other environmental air spaces in accordance with the NEC.

Galvanized steel EMT with or without a nonmetallic coating has not been investigated for severely corrosive conditions.

Aluminum EMT used in concrete or in contact with soil requires supplementary corrosion protection.

RELATED PRODUCTS

Fittings certified for use with EMT are covered under Electrical Metallic Tubing Fittings (FKAV) and Conduit Fittings (DWTT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 797, “Electrical Metallic Tubing – Steel,” and ANSI/UL 797A, “Electrical Metallic Tubing – Aluminum.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electrical Metallic Tubing” (or “EMT”).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRICAL METALLIC TUBING FITTINGS (FKAV)

GENERAL

This category covers electrical metallic tubing fittings such as connectors, couplings and expansion fittings, from 1/2 to 4 (metric designators 16 to 103) inclusive trade sizes, intended for installation and use in accordance with the following information and the limitations specified in Electrical Metallic Tubing (FJMX).

All male threaded fittings have only been investigated for use with lock-nuts.

Indentor Fittings — Indentor-type fittings are for use with metallic-coated electrical metallic tubing only and require a special tool supplied by the manufacturer for proper installation. Diametrically opposed indentor-type tools require two sets of indentations nominally 90° apart. Triple-indent tools require one set of indentations.

Grounding — These fittings are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with ANSI/NFPA 70, “National Electrical Code.”

Reusability — Fittings have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction.

PRODUCT MARKINGS

Fittings suitable for use in poured concrete or where exposed to rain are so indicated on the device or carton. The term “rain tight,” “wet location” or the equivalent on the carton indicates suitability for use where directly exposed to rain. The term “concrete tight” or equivalent on the carton indicates suitability for use in poured concrete.

Fittings have been tested for use only with steel tubing unless marked on the device or carton to indicate suitability for use with aluminum or other material.

CARTON MARKINGS

Electrical Metallic Tubing Fittings (FKAV)—Continued

A fitting that is taped completely (from the raceway to the box, or raceway to raceway) is concrete-tight when the product carton is marked "CONCRETE-TIGHT WHEN TAPED."

ADDITIONAL INFORMATION

For additional information, see Electrical Metallic Tubing (FJMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrical Metallic Tubing Fitting" (or "EMT Fitting"), "Connector" or "Coupling," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRICAL NONMETALLIC TUBING (FKHU)

USE AND INSTALLATION

This category covers electrical nonmetallic tubing (ENT) in trade sizes 1/2 to 2 (metric designators 16 to 53) inclusive for installation in accordance with Article 362 of ANSI/NFPA 70, "National Electrical Code" (NEC). This tubing is intended for installation and use in accordance with the following information. This tubing can be installed in residential attics up to 3 feet above the bottom of the ceiling joist.

Fittings — The outside diameters of ENT are such that standard connectors, couplings and outlet boxes for rigid PVC conduit can be employed for ENT that is also constructed of PVC. Installation instructions are provided with each bundle or coil of ENT outlining the procedure to be used when employing cemented-on PVC conduit fittings and outlet boxes. These techniques include the specific cement to be used as well as its application method. Other fittings are covered under Electrical-nonmetallic-tubing Fittings (FKKY).

ENT with mechanical fittings identified for the purpose or with cemented-on fittings is suitable for use in poured concrete.

ENT with cemented-on PVC fittings is suitable for use in:

1. Indoor locations where walls are frequently washed, and
2. Concrete slabs in direct contact with the earth.

PRODUCT MARKINGS

The product is provided with marking on the package, in combination with the UL Mark (every 10 ft), specifying the wire temperature rating, minimum installation temperature of -4°F (-20°C), and maximum ambient temperature 122°F (50°C). Products certified for 90°C wire insulation is suitable for use with 105°C rated GTO cable in accordance with Section 600.32(B) of the NEC. The product may be provided with a marking on the package and in combination with the UL Mark (every 10 ft) which reads "105 C GTO Cable." The product may be provided with a marking on the package that reads "For use in residential attics up to 3 feet above the bottom of ceiling joist."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1653, "Electrical Nonmetallic Tubing."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrical Nonmetallic Tubing."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRICAL NONMETALLIC TUBING FITTINGS (FKKY)

GENERAL

This category covers electrical-nonmetallic-tubing (ENT) fittings made in trade sizes 1/2 to 2 (metric designators 16 to 53). These fittings are intended for installation and use in accordance with the following information and the limitations specified in Electrical Nonmetallic Tubing (FKHU).

CARTON MARKINGS

Unless otherwise marked on the carton, fittings are suitable for use with any certified ENT of the appropriate trade size. If a fitting is suitable for use with only specific manufacturer's ENT, the smallest unit carton of the fittings identifies the ENT manufacturer(s). This compatibility marking appends any compatibility marking on the fitting carton.

Fittings suitable for use in concrete are identified by a marking on the carton. A fitting that is taped completely (from the raceway to the box or raceway-to-raceway) is concrete-tight, when the product carton is marked "CONCRETE-TIGHT WHEN TAPED."

ADDITIONAL INFORMATION

For additional information, see Electrical Nonmetallic Tubing (FKHU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1653, "Electrical Nonmetallic Tubing."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrical Nonmetallic Tubing Fitting" (or "ENT Fitting").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRIC DISCHARGE LAMP CONTROL EQUIPMENT (FKOT)

DRIVERS FOR LIGHT-EMITTING-DIODE ARRAYS, MODULES AND CONTROLLERS (FKSZ)

GENERAL

This category covers light-emitting-diode (LED) drivers providing a regulated output for an LED array or LED module, with or without an LED controller (control module). The output has LEDs connected in parallel or connected in series.

LED drivers are intended to be powered from alternating-current-supply branch circuits rated 600 V or less in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC); from low-voltage supplies; or from alternative sources, such as batteries, photovoltaic modules or fuel cells. A direct-plug-in, cord-and-plug, or field-wiring compartment is provided for connection to the branch circuit or other supplies.

LED drivers are not intended for recessed installation where direct contact with thermal insulation may occur.

PRODUCT MARKINGS

LED drivers are marked with:

- a) Input voltage, either the supply (line) voltage or a low voltage (ac or dc)
- b) Input current
- c) Input wattage, power factor or both (optional)
- d) Output maximum voltage
- e) Output current (the maximum current that could be supplied by the driver)
- f) Output volt-amperes or wattage
- g) Output type (isolated, direct or Class 2)
- h) Environmental location (dry, damp or wet)

The output type is used in determining the type of compatible LED array, a function of LED array construction. Output type "Isolated" refers to the output being electrically isolated from the supply circuit by insulation. Output type "Direct" refers to the output being electrically derived from the supply circuit without a separation by insulation.

LED drivers marked "Class 2" indicate that the output meets the voltage, current, and isolation criteria specified in ANSI/UL 1310, "Class 2 Power Units," or Article 725 of the NEC, and that Class 2 wiring methods may be used. A driver may have one or more outputs marked "Class 2."

ELECTRIC DISCHARGE LAMP CONTROL EQUIPMENT (FKOT)

Drivers for Light-emitting-diode Arrays, Modules and Controllers (FKSZ)—Continued

LED drivers are marked for environmental locations as defined in the NEC and Electrical Equipment for Use in Ordinary Locations (AALZ). The marking indicates the following uses:

- Dry location** — Suitable for indoor, dry locations.
- Damp (outdoor) location** — Suitable for use in (1) luminaires intended for wet or damp locations, (2) wet location signs if the driver is within an overall electrical enclosure, or, (3) other equipment or appliances. The interior of a luminaire or sign intended for wet locations is considered a damp location. The LED drivers are also suitable for indoor use.
- Wet location** — Suitable for use where water or other liquid can drip, splash, or flow on or against the device. The LED drivers are also suitable for indoor or damp location use.

LED drivers marked “High Power Factor” operate at 90% or higher power factor under the intended operating conditions or otherwise indicate those conditions that result in less than 90% power factor. Drivers marked “Power Factor Corrected” indicates the value of the power factor.

RELATED PRODUCTS

Power supplies that can be employed as LED drivers may also be covered under:

- Direct-plug-in and Cord-connected Class 2 Power Units (EPBU)
- Low-voltage Lighting Systems, Power Units, Luminaires and Fittings (IFDR)
- Power Supplies, General Purpose (QQFU) or Power Supplies, Specialty (QQJ)
- Sign Accessories (UYMR2)

LEDs arrays, modules and controllers are covered under:

- Light-emitting-diode Arrays, Modules and Controllers (OOQA2)
- Low-voltage Lighting Systems, Power Units, Luminaires and Fittings (IFDR)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 8750, “Light Emitting Diode (LED) Equipment for Use in Lighting Products.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “LED Driver.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FLUORESCENT LAMP BALLASTS (FKVS)

GENERAL

This category covers fluorescent lamp ballasts for both alternating and direct current. The ballasts are high-frequency electronic, resistor, choke (reactor) coil, or transformer of the isolating or auto type, and are for controlling the starting and operating voltages and currents of a fluorescent lamp. These ballasts are intended for connection in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC), to branch circuits rated 600 V or less. The output voltages are 2500 V or less.

Ballasts are investigated with their respective lamps and lampholders to determine the risk of electric shock during relamping.

Ballasts are generally provided with an enclosure but may be an open core-and-coil construction if the ballast is a simple-reactance type or an electronic type with various openings. Ballasts with openings are intended for use within suitable enclosures.

Some ballasts exhibit an inrush of current at the moment of initial operation, unless internal circuitry is provided to minimize the inrush. The inrush is similar to that exhibited in tungsten-filament incandescent lighting. Accordingly, it is recommended that lighting controls meet the tungsten-load requirement or be rated for use with the ballast in order to minimize incompatibility. (Refer to the particular lighting control category for more information on how the controls are marked regarding tungsten inrush.)

PRODUCT MARKINGS

Ballasts marked “Class P” are intended for use in luminaires or signs and provided with integral protection that prevents ballast overheating. This protection has been investigated to the Class P test program in ANSI/UL 935, “Fluorescent-Lamp Ballasts.”

Fluorescent Lamp Ballasts (FKVS)—Continued

Ballasts marked “High Power Factor” operate at 90% or higher power factor under the intended operating conditions or otherwise indicate those conditions that result in less than 90% power factor. Ballasts marked “Power Factor Corrected” indicate the value of the power factor.

Ballasts are marked with an output voltage when the output is over 300 V. The output voltage will be the maximum voltage existing between any two lead wires. Ballasts may additionally be marked with the maximum voltage to ground when it would aid in selecting lampholders. The voltage to ground will be the maximum voltage existing in any one lampholder and should be less than the rating of the lampholder.

Ballasts marked “For Use in Portable Lamps” have an output voltage of 150 V or less and are intended for use in portable luminaires without grounding.

Ballasts marked “For Use in Permanently Connected (or Fixed) Equipment Only” are not intended for cord-connected equipment.

Ballasts marked “Type CC” are intended for use in commercial cabinets, either refrigerated or nonrefrigerated, and where the ballast circuit is designed to minimize arcing within the lampholder in the event lamps become loose in their lampholders.

Ballasts marked “Type HL” are intended for use in luminaires in Class I, Division 2 hazardous (classified) locations as defined in Article 500 of the NEC.

Ballasts with a nonmetallic enclosure and marked “Suitable for Air Handling Spaces” have enclosures that may be used in environmental air spaces as defined in Section 300.22(C)(3) of the NEC. These products have been investigated in accordance with UL 2043, “Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces.”

Ballasts suitable for dimming fluorescent lamps are marked to indicate such use and, unless the dimming control leads are marked for connection to a Class 2 limited-energy circuit, the ballast is additionally marked with the catalog number of the dimming control for which the ballast is certified.

Fluorescent lamp ballasts are restricted in use as indicated below:

Indoor Ballasts — Indoor ballasts are suitable for use in indoor, dry locations only.

Outdoor Ballasts:

Type 1 outdoor ballasts are suitable for use in (1) outdoor equipment, (2) luminaires intended for wet or damp locations, or (3) outdoor signs if the ballasts are within an overall electrical enclosure. Ballasts of this type are marked “Type 1 Outdoor” or “Type 1.” These ballasts are also suitable for indoor use.

Type 2 outdoor ballasts are suitable for use in (1) outdoor equipment, (2) luminaires intended for wet or damp locations, or (3) outdoor signs if the ballasts, in addition to their own enclosure, are within an overall enclosure. Ballasts of this type are marked “Type 2 Outdoor” or “Type 2.” These ballasts are also suitable for indoor use.

Weatherproof Ballasts — Weatherproof ballasts are suitable for use where completely exposed to the weather without an additional enclosure and are marked “Weatherproof” or “WP.” These ballasts are suitable for indoor and outdoor use.

RELATED PRODUCTS

Devices for controlling HID lamps are covered under High-intensity-discharge Lamp Ballasts (FLCR).

Suitable controls intended for use with ballasts for dimming fluorescent lamps are covered under Dimmers, General Use Switch (EOYX) and Dimmers, Commercial (EOXT).

Ballasts within an integral enclosure with a compact fluorescent lampholder and a bi-pin or screw base are covered under Lamps, Self-Ballasted and Lamp Adapters (OOLR).

Devices for controlling electric sign gas tubes are covered under Neon Transformers and Power Supplies (PWIK).

Products Verified for energy efficiency are covered under Fluorescent Lamp Ballasts Verified for Energy Efficiency (ZWMR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 935, “Fluorescent-Lamp Ballasts.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fluorescent Lamp Ballast,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party.

PRODUCT CATEGORIES BY CATEGORY CODE

ELECTRIC DISCHARGE LAMP CONTROL EQUIPMENT
(FKOT)

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Fluorescent Lamp Ballasts (FKVS)—Continued

turer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HIGH-INTENSITY-DISCHARGE LAMP BALLASTS (FLCR)**GENERAL**

This category covers high-intensity-discharge (HID) lamp ballasts. The ballasts are high-frequency electronic, choke (reactor) coil, or transformer of the isolating or auto type, and are for controlling the starting and operating voltages and currents of one or more of the following lamp types: mercury vapor, metal halide, high-pressure sodium and low-pressure sodium. These ballasts are intended for connection in accordance with ANSI/NFPA 70, "National Electrical Code," to branch circuits rated 600 V or less. The output voltages are 1000 V or less.

PRODUCT MARKINGS

Ballasts intended for remote mounting in recessed installations are: (1) thermally protected, (2) marked "Thermally Protected" or the equivalent, and (3) marked "Suitable for Recessed Use." These ballasts are intended to be installed in uninsulated or insulated ceilings with all insulation kept a minimum distance of 3 in. from the sides of the ballasts and not placed over the ballasts such that it would entrap the heat produced by the ballasts. The ballasts are provided with thermal protection to deactivate the ballasts should insulation be placed over or in contact with the ballasts.

Ballasts not intended for recessed installations may be provided with thermal protection. If the ballasts are provided with thermal protection, they are marked "Thermally Protected" or the equivalent. The effectiveness of such protection must be investigated in combination with the specific luminaire with which the ballast is used.

HID lamp ballasts are restricted in use as indicated below:

Indoor Ballasts — Indoor ballasts are suitable for use in indoor, dry locations only.

Outdoor Ballasts:

Type 1 outdoor ballasts are suitable for use in (1) outdoor equipment, (2) luminaires intended for wet or damp locations, or (3) an outdoor sign if the ballasts are within an overall electrical enclosure. Ballasts of this type are marked "Type 1 Outdoor" or "Type 1." These ballasts are also suitable for indoor use.

Type 2 outdoor ballasts are suitable for use in (1) outdoor equipment, (2) luminaires intended for wet or damp locations, or (3) an outdoor sign if the ballasts, in addition to their own enclosure, are within an overall enclosure. Ballasts of this type are marked "Type 2 Outdoor" or "Type 2." These ballasts are also suitable for indoor use.

Weatherproof Ballasts — Weatherproof ballasts are suitable for use where completely exposed to the weather without an additional enclosure and are marked "Weatherproof" or "WP." These ballasts are suitable for indoor and outdoor use.

A ballast suitable for high-ambient temperature is marked "Ballast suitable for operation in ambient temperature not exceeding xx°C," where "xx" is 40, 55, 65, 75 or 90, or equivalent.

A ballast marked with a temperature value between 55 and 90°C inclusive, as described above, is considered exempt from the Energy Independence and Security Act of 2007 (Public Law 110-140), as is a ballast employing a minimum Class 180 insulation. Both of these ballasts are marked, "MEETS TEMPERATURE EXCLUSION OF PL 110-140."

RELATED PRODUCTS

Components associated with HID ballasts, such as lamp ignitors and other accessories, are covered under Electric Discharge Lamp Control Equipment, Specialty (FNFT2).

Devices for controlling fluorescent lamps are covered under Fluorescent Lamp Ballasts (FKVS).

Devices for controlling electric sign gas tubes are covered under Neon Transformers and Power Supplies (PWIK).

Power capacitors provided with HID ballasts are covered under Capacitors (CYWT2) or Capacitors, Construction Only (CZDS2); or the capacitor has been investigated as a part of the ballast.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1029, "High-Intensity-Discharge Lamp Ballasts."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ballast" or "Mercury Lamp Ballast," or other appropriate product name as shown in the individual Listings.

ELECTRIC DISCHARGE LAMP CONTROL EQUIPMENT (FKOT)

High-intensity-discharge Lamp Ballasts (FLCR)—Continued

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HOLDERS FOR AUTOMATIC STARTERS (FLPZ)**USE**

This category covers separate holders for automatic starters that are intended for use with electric discharge (fluorescent) lamps. Unless otherwise noted, they are rated 660 W, 250 V.

RELATED PRODUCTS

Holders in combination with or designed to be assembled with lampholders are covered under Lampholders, Electric Discharge, 1000 V or Less (OKCT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 496, "Lampholders."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Automatic Starter Holder."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

STARTERS, AUTOMATIC (FMDX)**USE**

This category covers automatic starters intended for use with electric discharge (fluorescent) lamps.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 542, "Fluorescent Lamp Starters."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Automatic Starter" or "Fluorescent Lamp Starter," or other appropriate product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

STARTERS, MANUAL (FMRV)**USE**

This category covers manual starter switches, and combinations of manual starter switches with line switches, intended for use with electric discharge (fluorescent) lamps.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 542, "Fluorescent Lamp Starters."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to

ELECTRIC DISCHARGE LAMP CONTROL EQUIPMENT (FKOT)

Starters, Manual (FMRV)—Continued

identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Manual Starter" or "Fluorescent Lamp Starter," or other appropriate product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRIC DISCHARGE LAMP CONTROL EQUIPMENT, SPECIALTY (FNFT)

GENERAL

This category covers ballasts for special industrial lamps, controls for auxiliary tungsten lamps, electromagnetic interference filters, fluorescent ballast and lamp power reducers, fluorescent lamp life extenders, high-intensity-discharge (HID) lamp high-low dimmers, HID lamp ignitors, time-out circuits for HID lamp ballasts, and related devices. These devices are for factory or field installation, in accordance with their installation instructions, into certified luminaires employing discharge lamps.

Fluorescent power-reducer devices are limited to installation only in luminaires employing thermally-protected ballasts, and are marked as such. The devices are designed for high-power-factor rapid-start ballasts, or high-power-factor instant-start ballasts, and marked as appropriate, unless marked for additional ballast types. These devices have not been investigated for use on emergency lighting equipment or with dimming ballasts, unless marked otherwise.

HID lamp high-low dimmers are limited to installation only in or with luminaires employing the lamp wattage and type, together with the ballast type and capacitor rating agreeing with the installation instructions provided with the dimmer.

RELATED PRODUCTS

Devices for controlling HID lamps are covered under High-intensity-discharge Lamp Ballasts (FLCR).

Devices for controlling fluorescent lamps are covered under Fluorescent Lamp Ballasts (FKVS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1029, "High-Intensity-Discharge Lamp Ballasts," or ANSI/UL 935, "Fluorescent-Lamp Ballasts," or the requirements contained in UL Subject 1029A, "Outline of Investigation for Ignitors and Related Auxiliaries for HID Lamp Ballasts."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRIC LAMP CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FNTR)

BALLASTS FOR USE IN HAZARDOUS LOCATIONS (FOGZ)

USE

This category covers alternating-current ballasts for high-intensity-discharge lamps. The power factor indicated can be considered as the approximate power factor under normal operating conditions.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

ELECTRIC LAMP CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FNTR)

Ballasts for Use in Hazardous Locations (FOGZ)—Continued

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 844, "Luminaires for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ballast for Use in Hazardous Locations."

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ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT COMPOUNDS (FOIZ)

USE

This category covers electrically conductive corrosion-resistant compounds for use on the threads of rigid metal conduit (RMC) and intermediate metal conduit (IMC). The compounds resist corrosion and provide electrical conductivity in accordance with Section 300.6(A) of ANSI/NFPA 70, "National Electrical Code", when used in accordance with the manufacturer's installation instructions.

These compounds have not been investigated for use in hazardous (classified) locations.

Reference should be made to the product label located on the smallest unit container for specific instructions as to the proper use of the compound.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2419, "Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrically Conductive Corrosion Resistant Compound."

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ELECTROMAGNETIC INTERFERENCE FILTERS (FOKY)

GENERAL

This category covers electromagnetic interference (EMI) filters factory installed in equipment connected to 600 V or lower potential circuits, and installed in accordance with ANSI/NFPA 70, "National Electrical Code." Such filters are used to attenuate unwanted radio-frequency signals (such as noise or interference) generated from electromagnetic sources. These filters consist of capacitors and inductors used alone or in combination with each other and may be provided with resistors.

Included in this category are cord-connected filters, direct-plug-in filters and facility filters.

This category does not cover transient-voltage surge suppressors (that is, devices for repeated limiting of voltage surges on power circuits such as silicone avalanche diodes, metal oxide varistors, and spark-gaps), or EMI filters for outdoor use.

Filter Types

Filters are designated one of the following types:
Cord-connected filter — A filter provided with a supply cord having an attachment plug for connecting the filter to a branch circuit receptacle. It is

PRODUCT CATEGORIES BY CATEGORY CODE

also provided with a receptacle for distribution of the filtered voltage to an external (appliance or other equipment) load.

Direct-plug-in filter — A filter provided with blades at the filter body that plug directly into a 15 A, 120 V branch circuit receptacle. It is also provided with a receptacle for the distribution of the filtered voltage to an external (appliance or other equipment) load.

Facility filter — A filter installed as part of the service, feeders, or branch circuitry of a building wiring system.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1283, "Electromagnetic Interference Filters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cord-connected EMI Filter," "Direct Plug-in EMI Filter" or "Facility EMI Filter."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTROMAGNETS FOR USE IN HAZARDOUS LOCATIONS (FOOM)

USE AND INSTALLATION

This category covers electromagnets, including electromagnetic separators, used to generate magnetic fields.

Special care should be taken to ensure suspended electromagnets are installed in accordance with the manufacturer's instructions, and that they are suspended from beams or cables with adequate strength.

Some types of electromagnetic separators use moving belts to move items out of the magnetic field. Special care should be taken to ensure that these products are installed in accordance with the manufacturer's instructions, and that guarding is provided on moving parts in accordance with local codes.

RELATED PRODUCTS

Electromagnetic interference filters used to attenuate unwanted radio frequency signals are covered under Electromagnetic Interference Filters (FOKY).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electromagnet for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELEVATOR EQUIPMENT (FQKR)

This category covers elevator controls and accessories, elevator control panels, elevator relays, elevator switches, elevator door-locking devices and contacts, passenger elevator car enclosures, and elevator oil buffers.

DUMBWAITERS (FQMA)

USE AND INSTALLATION

This category covers manually and power-operated dumbwaiters intended to lift and lower materials only.

Dumbwaiters (FQMA)—Continued

This category only covers dumbwaiters as defined in ANSI/ASME A17.1/CSA B44, "Safety Code for Elevators and Escalators," as follows: "A hoisting and lowering mechanism equipped with a car of limited size that moves in guide rails and serves two or more landings that is used exclusively for carrying materials."

This category covers the dumbwaiter controller, car and car door. It also covers driving machines that are attached to the car. It does not cover the dumbwaiter hoistway, hoistway enclosure, suspension means, counterweights, buffers or other equipment not attached to the car. The installation of the dumbwaiter in a hoistway, including the interaction of the car with hoistway doors, interlocks, terminal-stopping devices, and the like, has not been investigated.

Where safeties are attached to the car, the construction of these safeties is investigated to the construction requirements for safeties in ANSI/ASME A17.1/CSA B44. The proper operation of these safeties is dependent upon the complete installation. The suitability of the safeties, including performance, is dependent upon approval by the Authority Having Jurisdiction (AHJ).

The suitability of the complete installation, including proper operation and sequencing, is dependent upon approval by the AHJ.

Dumbwaiters are intended for installation in accordance with ANSI/ASME A17.1/CSA B44 and Article 620 of ANSI/NFPA 70, "National Electrical Code."

RELATED PRODUCTS

Elevator controls and accessories are covered under Elevator Controls and Accessories (FQMW).

Elevator control panels are covered under Elevator Control Panels (FQPB).

Elevator door locks are covered under Elevator-door-locking Devices and Contacts (FQXZ).

Elevator switches are covered under Elevator Switches (FRAH).

Material lifts that are not permanently installed are covered under Material Lifts (PGZH).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/ASME A17.5/CSA B44.1 (2004), "Elevator and Escalator Electrical Equipment," and the portions of Part 7 of ANSI/ASME A17.1/CSA B44 (2010), "Safety Code for Elevators and Escalators," applicable to dumbwaiter cars, car doors, and controllers, construction of safeties and driving machines.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrically-operated Dumbwaiter," "Power-operated Dumbwaiter" or "Manually-operated Dumbwaiter."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELEVATOR CONTROLS AND ACCESSORIES (FQMW)

GENERAL

This category covers elevator accessories such as push buttons, indicator lights and lighting fixtures, and elevator controls such as power supplies (motor and door operators) intended for use in elevator applications.

Some devices are open type (without enclosures), which means that such devices are for use as parts of certified equipment where the acceptability of the combination has been determined by UL or where open-type devices are acceptable.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

Seismic switches are additionally investigated to Clause 8.4.10.1.2 of ANSI/ASME A17.1/CSA B44 (2010), "Safety Code for Elevators and Escalators."

Where indicated in the individual certifications, elevator controls and accessories have additionally been investigated to ANSI/ASME A17.1, "Safety Code for Elevators and Escalators," and ANSI/ASME A17.5, "Elevator and Escalator Electrical Equipment."

UL MARK

Elevator Controls and Accessories (FQMW)–Continued

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Elevator Control" or "Elevator Accessory."

Products additionally investigated to ANSI/ASME A17.1 and ANSI/ASME A17.5 may also be marked, "Also Evaluated in Accordance with ANSI/ASME A17.1 – (date) and A17.5 – (date)."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELEVATOR CONTROL PANELS (FQPB)

USE

This category covers elevator control panels consisting of assemblies of equipment intended to control elevators, dumbwaiters, escalators, moving walks, inclined lifts and their associated equipment.

ADDITIONAL INFORMATION

For additional information, see Elevator Equipment (FQKR), Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 508A, "Industrial Control Panels."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

* ELEVATOR CONTROL PANEL

+
No.

* OPEN or ENCLOSED

- + One of the following statements, as applicable:
Statement No. 1: AS TO ELECTRICAL SHOCK AND FIRE HAZARD ONLY. CLASSIFICATION DOES NOT INCLUDE EVALUATION WITH RESPECT TO ANSI/ASME A17.1 OR A17.5.
- Statement No. 2: AS TO ELECTRICAL SHOCK AND FIRE HAZARD, AND IN ACCORDANCE WITH ANSI/ASME A17.1 [date] AND A17.5 [date].

Equipment that has been investigated with respect to electrical shock and fire hazard only is marked with Statement No. 1.

Equipment that has been investigated in accordance with the requirements of ANSI/ASME A17.1, "American National Standard Safety Code for Elevators and Escalators" and ANSI/ASME A17.5, "American National Standard Safety Code for Elevator and Escalator Electrical Equipment" is marked with Statement No. 2.

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ELEVATOR DOOR-LOCKING DEVICES AND CONTACTS (FQXZ)

GENERAL

This category covers devices designed for installation and operation in accordance with ANSI/ASME A17.1, "Safety Code for Elevators, Dumbwaiters, and Escalators and Moving Walks."

Elevator hoistway door interlocks are intended to prevent the operation of the driving machine by the normal operating device unless the hoistway door is locked in the closed position, and to prevent the opening of the hoistway door from the landing side unless the car is within the landing zone and is either stopped or being stopped.

Retiring cams are not covered under this category, and their acceptability must be determined at the point of installation by the Authority Having Jurisdiction.

Elevator hoistway door combination mechanical locks and electric contacts are intended to prevent operation of the driving machine by the normal operating device unless the hoistway door is in the closed position,

Elevator Door-locking Devices and Contacts (FQXZ)–Continued

and to lock the hoistway door in the closed position and prevent it from being opened from the landing side unless the car is within the landing zone.

Elevator hoistway door, car door or gate electric contacts are intended to prevent operation of the driving machine by the normal operating device unless the door or gate is in the closed position.

These devices are investigated for misalignment conditions when properly installed as recommended by the manufacturer. Their acceptability is to be determined at the point of installation by the Authority Having Jurisdiction.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Building Materials (AABM).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 104, "Elevator Door Locking Devices and Contacts."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Elevator Interlock," "Elevator Interlock Retiring Cam Required," "Elevator Combination Mechanical Lock and Electric Contact," "Elevator Electric Contact," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELEVATOR OIL BUFFERS (FQZD)

GENERAL

This category covers products intended for installation under elevator cars having a rated speed in excess of 50 ft/min in order to stop a descending car beyond its normal limit of travel. They have been certified to paragraph 201.4g of ANSI/ASME A17.1, "Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 104, "Elevator Door Locking Devices and Contacts."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY]
IN ACCORDANCE WITH THE AMERICAN NATIONAL STANDARD
SAFETY CODE FOR ELEVATORS, DUMBWAITERS, ESCALATORS
AND MOVING WALKS
ANSI/ASME A17.1 (issue date), PARAGRAPH 201.4g
Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELEVATOR SWITCHES (FRAH)

USE AND INSTALLATION

This category covers switches intended for use with elevator system cars or shafts. The switches are designed for installation and operation in accordance with ANSI/ASME A17.1, "Safety Code for Elevators and Escalators."

These switches have been investigated for proper operation when installed as recommended by the manufacturer. Their acceptability is determined at the point of installation by the Authority Having Jurisdiction.

RELATED PRODUCTS

PRODUCT CATEGORIES BY CATEGORY CODE

Elevator Switches (FRAH)—Continued

Elevator-door-locking devices and contacts are covered under Elevator-door-locking Devices and Contacts (FQXZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 104, "Elevator Door Locking Devices and Contacts."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Elevator Limit Switch" or "Elevator Slack Cable Switch," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PASSENGER ELEVATOR CAR ENCLOSURES (FRBK)**GENERAL**

This category covers passenger elevator car enclosures, which are factory-built assemblies of wall and ceiling panels intended to be secured to a car platform.

These factory-built enclosures incorporate materials and equipment such as decorative panels, suspended ceilings and luminaires which, after installation, may not be accessible for inspection at the installation site.

These factory-built enclosures may be shipped disassembled.

This category does not cover freight car enclosures, enclosures having glass panels in excess of 1 sq ft in area, enclosures having gates, weights, vertically sliding car doors, or padded linings for temporary use in passenger cars during the handling of freight.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Equipment investigated after March 23, 2001 has been investigated to the applicable paragraphs of Section 2.14 of the edition of ANSI/ASME A17.1, "Safety Code for Elevators and Escalators," noted in the individual certifications.

Equipment investigated prior to March 23, 2001 has been investigated to Section 204 of the edition (1996 or earlier) of ANSI/ASME A17.1 noted in the individual certifications.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**PASSENGER ELEVATOR CAR ENCLOSURE
IN ACCORDANCE WITH THE AMERICAN NATIONAL STANDARD
SAFETY CODE FOR ELEVATORS AND ESCALATORS
ANSI/ASME A17.1 [date of standard] SECTION 204**

or

**PASSENGER ELEVATOR CAR ENCLOSURE
IN ACCORDANCE WITH THE AMERICAN NATIONAL STANDARD
SAFETY CODE FOR ELEVATORS AND ESCALATORS
ANSI/ASME A17.1 [date of standard], SECTION 2.14**

The Classification Mark for passenger elevator car enclosures appears on the upper surface of the top of the car enclosure. Each knocked-down part of the enclosure bears the supplementary statement "Knock down Enclosure Part for Classified Elevator Enclosure."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELEVATOR EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FRZV)

This category covers hoistway door interlocks, hoistway limit switches, hoistway-door combination mechanical locks and electric contacts, hoistway-door or car door or gate electric contacts, and elevator control panels.

ELEVATOR CONTROL PANELS FOR USE IN HAZARDOUS LOCATIONS (FSNA)**USE**

This category covers elevator control panels consisting of assemblies of equipment intended to control elevators, dumbwaiters, escalators, moving walks, inclined lifts, and their associated equipment.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

Where indicated in the individual certifications, elevator control panels have also been investigated to ANSI/ASME A17.1, "Safety Code for Elevators and Escalators," and ANSI/ASME A17.5, "Elevator and Escalator Electrical Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**ELEVATOR CONTROL PANEL FOR USE IN HAZARDOUS LOCATIONS
AS TO ELECTRICAL SHOCK, EXPLOSION AND FIRE HAZARD ONLY
Issue No.**

Where indicated in the individual Classifications, the Classification Mark will also include the statement:

**ALSO CLASSIFIED IN ACCORDANCE WITH ANSI/ASME A17.1-(date)
AND ANSI/ASME A17.5-(date)**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELEVATOR DOOR-LOCKING DEVICES AND CONTACTS FOR USE IN HAZARDOUS LOCATIONS (FSNT)**GENERAL**

This category covers devices designed for use in elevators and intended for installation and operation in accordance with the requirements of ANSI/ASME A17.1, "Safety Code for Elevators and Escalators."

Elevator hoistway door interlocks are intended to prevent the operation of the driving machine by the normal operating device unless the hoistway door is locked in the closed position, and to prevent the opening of the hoistway door from the landing side unless the car is within the landing zone and is either stopped or being stopped.

Interlocks that do not require the use of a retiring cam bear the product name (A) under **PRODUCT IDENTITY**.

Interlocks that require the use of a retiring cam bear the product name (B) under **PRODUCT IDENTITY**.

This category does not cover retiring cams. Their acceptability must be determined at the point of installation by the Authority Having Jurisdiction.

Elevator hoistway door combination mechanical locks and electric contacts are intended to prevent operation of the driving machine by the normal operating device unless the hoistway door is in the closed position, and to lock the hoistway door in the closed position and prevent it from being opened from the landing side unless the car is within the landing zone. These locks and contacts bear the product name (C) under **PRODUCT IDENTITY**.

Elevator hoistway door, car door or gate electric contacts are intended to prevent operation of the driving machine by the normal operating device unless the door or gate is in the closed position. These contacts bear the product name (D) under **PRODUCT IDENTITY**.

These devices have been investigated for misalignment conditions when properly installed as recommended by the manufacturer. Their acceptability is to be determined at the point of installation by the Authority Having Jurisdiction.

ADDITIONAL INFORMATION

ELEVATOR EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FRZV)

Elevator Door-locking Devices and Contacts for Use in Hazardous Locations (FSNT)–Continued

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate:

- (A) "Elevator Interlock for Hazardous Locations"
- (B) "Elevator Interlock for Hazardous Locations – Retiring Cam Required"
- (C) "Elevator Combination Mechanical Lock and Electric Contact for Hazardous Locations"
- (D) "Elevator Electric Contact for Hazardous Locations"

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FUNCTIONAL SAFETY CERTIFICATES ONLY (FSCO)

GENERAL

This category covers energy and industrial systems, such as photovoltaic systems, wind turbines, power conversion equipment, utility interactive devices, motor controllers, battery management systems, battery chargers, proximity switches, elevator control panels, etc., that have been certified for functional safety.

Functional safety relates to all functions, such as control, protection and monitoring, that are intended to reduce the risk of fire, electric shock or injury to persons.

Functional-safety investigations cover a product's programmable electronics (i.e., hardware and embedded software), but also products with hardware-implemented functions only.

Software may be the embedded instructions that reside in a programmable component and that perform some of the functions of the product under investigation. Software may be application-specific, i.e., the software is limited to a specific, dedicated, designated use. The software to be investigated may include operating systems, support tools, firmware and application systems.

In addition to electronic hardware and software, functional-safety investigations may include other technologies such as mechanical, hydraulic, pneumatic, and combinations thereof.

Functional-safety investigations may also be conducted for systems and/or subsystems of multiple products. These investigations often include the following elements:

- Review of the engineering documentation produced during the development, operation and maintenance of the product or system
- Risk analysis, including Hazard-based Safety Engineering (HBSE) Analysis
- Safety life-cycle management

The functional-safety investigation may result in attributing functional-safety ratings such as a safety integrity level (SIL) or performance level (PL) to the different safety-related functions. It is the responsibility of the customer to determine and specify these safety functions, the functional-safety standards to which the products are intended to be certified, and the desired functional-safety ratings.

The product manual and individual Listing should be consulted for detailed information and instructions about a particular product.

ABBREVIATIONS AND TERMS

The following abbreviations and terms are used in the individual Listings:

FUNCTIONAL SAFETY CERTIFICATES ONLY (FSCO)

Abbreviation/Term	Definition
ASIL	Automotive safety integrity level — One of four levels (A through D) to specify an item's or element's necessary requirements of ISO/Draft International Standard 26262-1 through 26262-10, and safety measures for avoiding an unreasonable residual risk, with "D" representing the most stringent level and "A" the least stringent level.
Beta Factor	The measure for susceptibility of Common Cause Failure (see CCF below).
Category	Classification of the safety-related parts of a control system with respect to their resistance to faults and their subsequent behavior in the fault condition, and which is achieved by the structural arrangement of the parts and/or their reliability. There are five categories (b, 1, 2, 3, 4) with "b" representing the lowest level of resistance and "4" representing the highest level of resistance.
CCF	Common cause failure — Failure as the result of one or more events, causing concurrent failures of two or more separate channels in a multiple-channel system, leading to system failure. ANSI/UL 1998 defines software classes: Software Class 1: Sections of software intended to control function to reduce the likelihood of a risk associated with the equipment. Examples of sections that may be considered Software Class 1 functions are thermal cutouts and door locks for laundry equipment. Software Class 2: Sections of software intended to control functions to reduce the likelihood of special risks (e.g., explosion) associated with the equipment. Examples of sections that may be considered Software Class 2 functions are automatic burner controls and thermal cutouts for closed water-heater systems (unvented).
Class	The measure of the effectiveness of diagnostics, which may be determined as the ratio between the failure rate of detected dangerous failures and the failure rate of total dangerous failures. Instead of a precise percentage value, EN ISO/ISO 13849-1 defines four percentage ranges for diagnostic coverage: None, Low, Medium and High.
Diagnostic Coverage	Hardware fault tolerance — The ability of a system to continue nonstop when a hardware failure occurs. 0 = susceptible at a single fault 1 = susceptible at two faults 2 = susceptible at three faults
HFT	Mean time to failure (dangerous) — A measure of reliability of a piece of equipment, given the average time before the first failure.
MTTF _d	Average probability of a dangerous failure on demand of the safety function — Safety unavailability of an electrical/electronic/programmable electronic (E/E/PE) safety-related system to perform the specified safety function when a demand occurs from the equipment under control (EUC) or EUC control system.
PFD _{avg}	Average frequency of a dangerous failure of the safety function per hour — The average frequency of a dangerous failure of an E/E/PE safety-related system to perform the specified safety function over a given period of time.
PFH _{avg}	

PRODUCT CATEGORIES BY CATEGORY CODE

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Abbreviation/Term	Definition
PL	Performance level — A discrete level used to specify the ability of safety-related parts of a control system to perform a safety function under foreseeable conditions. There are five levels (a through e), with "a" representing the lowest ability level and "e" the highest ability level.
SFF	Safe failure fraction — The property of a safety-related element defined by the ratio of the average failure rates of safe plus dangerous detected failures and safe plus dangerous failures.
SIL	Safety integrity level — A discrete level (one out of a possible four) corresponding to a range of safety integrity values, where safety integrity level 4 has the highest level of safety integrity and safety integrity level 1 has the lowest.
SIL Capability	Defined by EN/IEC 61800-5-2: The maximum SIL that can be claimed to have been achieved by the design of a power drive system suitable for use in safety-related applications in terms of the systematic safety integrity and the architectural constraints on hardware safety integrity. There are three levels, where SIL capability 3 has the highest level of safety integrity and SIL capability 1 has the lowest. Certification of a safety function to a certain SIL capability will, in addition to systematic safety integrity and architectural constraints, also include the PFH of the safety function.
SIL CL	SIL Claim Limit — Defined by EN/IEC 62061: The maximum SIL that can be claimed for a safety-related subsystem in relation to architectural constraints and systematic safety integrity. There are three levels, where SIL claim limit 3 has the highest level of safety integrity and SIL claim limit 1 has the lowest. Certification of a safety function to a certain SIL claim limit will, in addition to systematic safety integrity and architectural constraints, also include the PFH of the safety function.
Type	Defined by CAN/CSA E61496-1 and EN/IEC 61496-1: A measure of performance (2, 3 or 4) of electro-sensitive protective equipment in the presence of faults and under influences from environmental conditions. Types 2, 3 and 4 are similarly defined as the Categories 2, 3 and 4 of EN ISO/ISO 13849-1, respectively.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ), Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ), Marine Products (AAMP) and Mechanical Equipment and Associated Products (AAME).

REQUIREMENTS

The following standards are used to investigate products in this category for functional safety, as noted in the individual Listings:

- UL 991 (2004), "Tests for Safety-Related Controls Employing Solid-State Devices"
- ANSI/UL 1998 (1998), "Software in Programmable Components" (used in conjunction with UL 991 for products that include software)
- ANSI/UL 61496-1 (2007), "Electro-Sensitive Protective Equipment, Part 1: General Requirements and Tests"
- ANSI/ASME A17.1/CSA B44 (2007), "Safety Code for Elevators and Escalators"
- CSA-C22.2 No. 0.8 (2009), "Safety Functions Incorporating Electronic Technology"
- CAN/CSA E61496-1 (2004), "Safety of Machinery – Electro-Sensitive Protective Equipment – Part 1: General Requirements and Tests"
- EN 50271 (2010), "Electrical Apparatus for the Detection and Measurement of Combustible Gases, Toxic Gases or Oxygen – Requirements and Tests for Apparatus Using Software and/or Digital Technologies"
- IEC 60335-1 (2010), "Household and Similar Electrical Appliances – Safety – Part 1: General Requirements"

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- IEC 60730-1 (2010), "Automatic Electrical Controls for Household and Similar Use – Part 1: General Requirements"
- EN/IEC 61496-1 (2008), "Safety of Machinery – Electro-Sensitive Protective Equipment – Part 1: General Requirements and Tests"
- EN/IEC 61508-1 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 1: General Requirements"
- EN/IEC 61508-2 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 2: Requirements for Electrical/Electronic/Programmable Electronic Safety-Related Systems"
- EN/IEC 61508-3 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 3: Software Requirements"
- EN/IEC 61508-4 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 4: Definitions and Abbreviations"
- EN/IEC 61508-5 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 5: Examples of Methods for the Determination of Safety Integrity Levels"
- EN/IEC 61508-6 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 6: Guidelines on the Application of IEC 61508-2 and IEC 61508-3"
- EN/IEC 61508-7 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 7: Overview of Techniques and Measures"
- EN/IEC 61511-1 (2003), "Functional Safety – Safety Instrumented Systems for the Process Industry Sector – Part 1: Framework, Definitions, System, Hardware and Software Requirements"
- EN/IEC 61511-2 (2003), "Functional Safety – Safety Instrumented Systems for the Process Industry Sector – Part 2: Guidelines for the Application of IEC 61511-1"
- EN/IEC 61511-3 (2003), "Functional Safety – Safety Instrumented Systems for the Process Industry Sector – Part 3: Guidance for the Determination of the Required Safety Integrity Levels"
- EN/IEC 61800-5-2 (2007), "Adjustable Speed Electrical Power Drive Systems – Part 5-2: Safety Requirements – Functional"
- EN/IEC 62061 (2005), "Safety of Machinery – Functional Safety of Safety-Related Electrical, Electronic, and Programmable Electronic Control Systems"
- EN ISO/ISO 13849-1 (2006), "Safety of Machinery – Safety-Related Parts of Control Systems – Part 1: General Principles for Design"
- ANSI/RIA/ISO 10218-1 (2007), "Robots for Industrial Environments – Safety Requirements – Part 1: Robot"
- EN ISO/ISO 10218-1 (2006), "Robots for Industrial Environments – Safety Requirements – Part 1: Robot"
- ISO/Draft International Standard 26262-1 (2009), "Road Vehicles – Functional Safety – Part 1: Vocabulary"
- ISO/Draft International Standard 26262-2 (2009), "Road Vehicles – Functional Safety – Part 2: Management of Functional Safety"
- ISO/Draft International Standard 26262-3 (2009), "Road Vehicles – Functional Safety – Part 3: Concept Phase"
- ISO/Draft International Standard 26262-4 (2009), "Road Vehicles – Functional Safety – Part 4: Product Development: System Level"
- ISO/Draft International Standard 26262-5 (2009), "Road Vehicles – Functional Safety – Part 5: Product Development: Hardware Level"
- ISO/Draft International Standard 26262-6 (2009), "Road Vehicles – Functional Safety – Part 6: Product Development: Software Level"
- ISO/Draft International Standard 26262-7 (2009), "Road Vehicles – Functional Safety – Part 7: Production and Operation"
- ISO/Draft International Standard 26262-8 (2009), "Road Vehicles – Functional Safety – Part 8: Supporting Processes"
- ISO/Draft International Standard 26262-9 (2009), "Road Vehicles – Functional Safety – Part 9: ASIL-Oriented and Safety-Oriented Analyses"
- ISO/Draft International Standard 26262-10 (2009), "Road Vehicles – Functional Safety – Part 10: Guideline"

UL CERTIFICATE

UL's Functional Safety Certificate Program covers products investigated for functional safety only, without UL Listing or Recognition. The Functional Safety Certificate means that UL has investigated a sample of the product and determined that it complies with the safety requirements of a published functional-safety standard. The Certificate is valid for a period of three years from the date of issue.

At a minimum, the Certificate contains the following information:

- Certificate number
- Issue date of certificate
- Type of certified product
- Model
- SIL/PL/Class
- Conditions of use, if applicable

FUNCTIONAL SAFETY CERTIFICATES ONLY (FSCO)

- Tested according to
- Test Report number
- Certificate expiration date

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ENERGY AND INDUSTRIAL SYSTEMS CERTIFIED FOR FUNCTIONAL SAFETY (FSPC)

GENERAL

This category covers energy and industrial systems, such as photovoltaic systems, wind turbines, power conversion equipment, utility interactive devices, motor controllers, battery management systems, battery chargers, proximity switches, elevator control panels, etc., that have been certified for functional safety.

Functional safety relates to all functions, such as control, protection and monitoring, that are intended to reduce the risk of fire, electric shock or injury to persons.

Functional-safety investigations cover a product's programmable electronics (i.e., hardware and embedded software), but also products with hardware-implemented functions only.

Software may be the embedded instructions that reside in a programmable component and that perform some of the functions of the product under investigation. Software may be application-specific, i.e., the software is limited to a specific, dedicated, designated use. The software to be investigated may include operating systems, support tools, firmware and application systems.

In addition to electronic hardware and software, functional-safety investigations may include other technologies such as mechanical, hydraulic, pneumatic, and combinations thereof.

Functional-safety investigations may also be conducted for systems and/or subsystems of multiple products. These investigations often include the following elements:

- Review of the engineering documentation produced during the development, operation and maintenance of the product or system
- Risk analysis, including Hazard-based Safety Engineering (HBSE) Analysis
- Safety life-cycle management

The functional-safety investigation may result in attributing functional-safety ratings such as a safety integrity level (SIL) or performance level (PL) to the different safety-related functions. It is the responsibility of the customer to determine and specify these safety functions, the functional-safety standards to which the products are intended to be certified, and the desired functional-safety ratings.

The product manual and individual Listing should be consulted for detailed information and instructions about a particular product.

ABBREVIATIONS AND TERMS

The following abbreviations and terms are used in the individual Listings:

Abbreviation/Term
ASIL

Definition
Automotive safety integrity level — One of four levels (A through D) to specify an item's or element's necessary requirements of ISO/Draft International Standard 26262-1 through 26262-10, and safety measures for avoiding an unreasonable residual risk, with "D" representing the most stringent level and "A" the least stringent level.

Beta Factor

The measure for susceptibility of Common Cause Failure (see CCF below). Classification of the safety-related parts of a control system with respect to their resistance to faults and their subsequent behavior in the fault condition, and which is achieved by the structural arrangement of the parts and/or their reliability. There are five categories (b, 1, 2, 3, 4) with "b" representing the lowest level of resistance and "4" representing the highest level of resistance.

Category

ENERGY AND INDUSTRIAL SYSTEMS CERTIFIED FOR FUNCTIONAL SAFETY (FSPC)

Abbreviation/Term

CCF

Definition

Common cause failure — Failure as the result of one or more events, causing concurrent failures of two or more separate channels in a multiple-channel system, leading to system failure.

Class

ANSI/UL 1998 defines software classes:
Software Class 1: Sections of software intended to control function to reduce the likelihood of a risk associated with the equipment. Examples of sections that may be considered Software Class 1 functions are thermal cutouts and door locks for laundry equipment.

Software Class 2: Sections of software intended to control functions to reduce the likelihood of special risks (e.g., explosion) associated with the equipment. Examples of sections that may be considered Software Class 2 functions are automatic burner controls and thermal cutouts for closed water-heater systems (unvented).

Diagnostic Coverage

The measure of the effectiveness of diagnostics, which may be determined as the ratio between the failure rate of detected dangerous failures and the failure rate of total dangerous failures. Instead of a precise percentage value, EN ISO/ISO 13849-1 defines four percentage ranges for diagnostic coverage: None, Low, Medium and High.

HFT

Hardware fault tolerance — The ability of a system to continue nonstop when a hardware failure occurs.

- 0 = susceptible at a single fault
- 1 = susceptible at two faults
- 2 = susceptible at three faults

MTTF_d

Mean time to failure (dangerous) — A measure of reliability of a piece of equipment, given the average time before the first failure.

PFD_{avg}

Average probability of a dangerous failure on demand of the safety function — Safety unavailability of an electrical/electronic/programmable electronic (E/E/PE) safety-related system to perform the specified safety function when a demand occurs from the equipment under control (EUC) or EUC control system.

PFH_{avg}

Average frequency of a dangerous failure of the safety function per hour — The average frequency of a dangerous failure of an E/E/PE safety-related system to perform the specified safety function over a given period of time.

PL

Performance level — A discrete level used to specify the ability of safety-related parts of a control system to perform a safety function under foreseeable conditions. There are five levels (a through e), with "a" representing the lowest ability level and "e" the highest ability level.

SFF

Safe failure fraction — The property of a safety-related element defined by the ratio of the average failure rates of safe plus dangerous detected failures and safe plus dangerous failures.

SIL

Safety integrity level — A discrete level (one out of a possible four) corresponding to a range of safety integrity values, where safety integrity level 4 has the highest level of safety integrity and safety integrity level 1 has the lowest.

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Abbreviation/Term
SIL Capability

Definition

Defined by EN/IEC 61800-5-2: The maximum SIL that can be claimed to have been achieved by the design of a power drive system suitable for use in safety-related applications in terms of the systematic safety integrity and the architectural constraints on hardware safety integrity. There are three levels, where SIL capability 3 has the highest level of safety integrity and SIL capability 1 has the lowest.

Certification of a safety function to a certain SIL capability will, in addition to systematic safety integrity and architectural constraints, also include the PFH of the safety function.

SIL CL

SIL Claim Limit — Defined by EN/IEC 62061: The maximum SIL that can be claimed for a safety-related subsystem in relation to architectural constraints and systematic safety integrity. There are three levels, where SIL claim limit 3 has the highest level of safety integrity and SIL claim limit 1 has the lowest.

Certification of a safety function to a certain SIL claim limit will, in addition to systematic safety integrity and architectural constraints, also include the PFH of the safety function.

Type

Defined by ANSI/UL 61496-1: A measure of performance (2, 3 or 4) of electro-sensitive protective equipment in the presence of faults and under influences from environmental conditions. Types 2, 3 and 4 are similarly defined as the Categories 2, 3 and 4 of EN/ISO 13849-1, respectively.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ), Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ), Marine Products (AAMP) and Mechanical Equipment and Associated Products (AAMP).

REQUIREMENTS

The following standards are used to investigate products in this category for functional safety, as noted in the individual Listings:

- UL 991 (2004), "Tests for Safety-Related Controls Employing Solid-State Devices"
- ANSI/UL 1998 (1998), "Software in Programmable Components" (used in conjunction with UL 991 for products that include software)
- ANSI/UL 61496-1 (2007), "Electro-Sensitive Protective Equipment, Part 1: General Requirements and Tests"
- ANSI/ASME A17.1/CSA B44 (2007), "Safety Code for Elevators and Escalators"
- EN 50271 (2010), "Electrical Apparatus for the Detection and Measurement of Combustible Gases, Toxic Gases or Oxygen – Requirements and Tests for Apparatus Using Software and/or Digital Technologies"
- IEC 60335-1 (2010), "Household and Similar Electrical Appliances – Safety – Part 1: General Requirements"
- IEC 60730-1 (2010), "Automatic Electrical Controls for Household and Similar Use – Part 1: General Requirements"
- EN/IEC 61508-1 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 1: General Requirements"
- EN/IEC 61508-2 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 2: Requirements for Electrical/Electronic/Programmable Electronic Safety-Related Systems"
- EN/IEC 61508-3 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 3: Software Requirements"
- EN/IEC 61508-4 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 4: Definitions and Abbreviations"
- EN/IEC 61508-5 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 5: Examples of Methods for the Determination of Safety Integrity Levels"
- EN/IEC 61508-6 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 6: Guidelines on the Application of IEC 61508-2 and IEC 61508-3"
- EN/IEC 61508-7 (2010), "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 7: Overview of Techniques and Measures"

ENERGY AND INDUSTRIAL SYSTEMS CERTIFIED FOR FUNCTIONAL SAFETY (FSPC)

- EN/IEC 61511-1 (2003), "Functional Safety – Safety Instrumented Systems for the Process Industry Sector – Part 1: Framework, Definitions, System, Hardware and Software Requirements"
- EN/IEC 61511-2 (2003), "Functional Safety – Safety Instrumented Systems for the Process Industry Sector – Part 2: Guidelines for the Application of IEC 61511-1"
- EN/IEC 61511-3 (2003), "Functional Safety – Safety Instrumented Systems for the Process Industry Sector – Part 3: Guidance for the Determination of the Required Safety Integrity Levels"
- EN/IEC 61800-5-2 (2007), "Adjustable Speed Electrical Power Drive Systems – Part 5-2: Safety Requirements – Functional"
- EN/IEC 62061 (2005), "Safety of Machinery – Functional Safety of Safety-Related Electrical, Electronic, and Programmable Electronic Control Systems"
- EN ISO/ISO 13849-1 (2006), "Safety of Machinery – Safety-Related Parts of Control Systems – Part 1: General Principles for Design"
- ANSI/RIA/ISO 10218-1 (2007), "Robots for Industrial Environments – Safety Requirements – Part 1: Robot"
- ISO/Draft International Standard 26262-1 (2009), "Road Vehicles – Functional Safety – Part 1: Vocabulary"
- ISO/Draft International Standard 26262-2 (2009), "Road Vehicles – Functional Safety – Part 2: Management of Functional Safety"
- ISO/Draft International Standard 26262-3 (2009), "Road Vehicles – Functional Safety – Part 3: Concept Phase"
- ISO/Draft International Standard 26262-4 (2009), "Road Vehicles – Functional Safety – Part 4: Product Development: System Level"
- ISO/Draft International Standard 26262-5 (2009), "Road Vehicles – Functional Safety – Part 5: Product Development: Hardware Level"
- ISO/Draft International Standard 26262-6 (2009), "Road Vehicles – Functional Safety – Part 6: Product Development: Software Level"
- ISO/Draft International Standard 26262-7 (2009), "Road Vehicles – Functional Safety – Part 7: Production and Operation"
- ISO/Draft International Standard 26262-8 (2009), "Road Vehicles – Functional Safety – Part 8: Supporting Processes"
- ISO/Draft International Standard 26262-9 (2009), "Road Vehicles – Functional Safety – Part 9: ASIL-Oriented and Safety-Oriented Analyses"
- ISO/Draft International Standard 26262-10 (2009), "Road Vehicles – Functional Safety – Part 10: Guideline"

UL MARK

Products are eligible to bear the UL Functional Safety Mark when a product is investigated for both UL Listing and functional safety.

The Functional Safety Listing Mark of UL on the product, or the UL symbol on the product and the Functional Safety Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Functional Safety Listing Mark for these products includes the UL symbol with the words "FUNCTIONAL SAFETY" above the UL symbol (as illustrated in the Introduction of this Directory), the word "LISTED," and the following additional information:

[PRODUCT IDENTITY*]

Control No.

ALSO INVESTIGATED TO [STANDARD** (YEAR+) ***]

See installation manual for safety functions

* The appropriate product identity as shown in the Listing Mark for the product category

** Where a set of standards is referenced as individual parts (e.g., EN/IEC 61508-1, 61508-2, 61508-3), the standard set is shown in this format: EN/IEC 61508, Parts 1 – 3

+ Where individual parts of a set of standards have different edition dates, the latest date is used

*** Safety rating (e.g., SIL 3, PL e, Category 1); may include the words "UP TO" (e.g., UP TO SIL 3)

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELEVATOR EQUIPMENT RELATING TO HAZARDOUS LOCATIONS (FSRA)

ELEVATOR CONTROL PANELS RELATING TO HAZARDOUS LOCATIONS (FSSA)

GENERAL

This category covers elevator control panels consisting of assemblies of equipment intended to control elevators, dumbwaiters, escalators, moving walks, inclined lifts, and their associated equipment.

ELEVATOR EQUIPMENT RELATING TO HAZARDOUS LOCATIONS (FSRA)

Elevator Control Panels Relating to Hazardous Locations (FSSA)—Continued

Elevator control panels relating to hazardous locations are intended for installation in unclassified locations. They are provided with intrinsically safe (low energy) circuit(s) as indicated on the product, for extension into a hazardous (classified) location.

For intrinsically safe circuits, the energy level available in the hazardous location under normal and abnormal conditions is sufficiently low as not to cause ignition of the specified explosive atmospheres. To maintain the low energy levels, it is necessary that the intrinsically safe and associated equipment be installed and interconnected in accordance with the instructions provided. The intrinsically safe circuit wiring must be routed in a separate raceway or otherwise reliably segregated from all power and other circuit wiring to preclude excessive currents and voltages from being impressed on the intrinsically safe circuit, rendering it nonintrinsically safe.

The investigation of elevator control panels relating to hazardous locations does not include investigation of the function of the controlled equipment.

RELATED PRODUCTS

Elevator control panels for use in hazardous (classified) locations are covered under Elevator Control Panels for Use in Hazardous Locations (FSNA).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 508A, "Industrial Control Panels."

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 698A, "Industrial Control Panels Relating to Hazardous (Classified) Locations."

Where indicated in the individual Classifications, elevator control panels have also been investigated to ANSI/ASME A17.1, "Safety Code for Elevators and Escalators," and ANSI/ASME A17.5, "Elevator and Escalator Electrical Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

ELEVATOR CONTROL PANEL RELATING TO HAZARDOUS LOCATIONS

WITH INTRINSICALLY SAFE CIRCUIT EXTENSIONS AS TO ELECTRICAL SHOCK, EXPLOSION AND FIRE HAZARD ONLY Issue No.

Where indicated in the individual Classifications, the Classification Mark will also include the statement:

ALSO CLASSIFIED IN ACCORDANCE WITH ANSI/ASME A17.1-(date) AND ANSI/ASME A17.5-(date)

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EMERGENCY LIGHTING AND POWER EQUIPMENT (FTBR)

USE

This category covers electrical emergency lighting and power equipment for use in accordance with ANSI/NFPA 101, "Life Safety Code," Article 700 of ANSI/NFPA 70, "National Electrical Code," and the "International Building Code" (IBC).

Emergency power equipment is intended to supply sufficient electrical energy for emergency luminaire operation, or to distribute and manage the electrical energy for emergency luminaires from a remote emergency supply source. Emergency power equipment with batteries has a test switch and visible or audible indicators to report the readiness of the emergency supply.

Emergency lighting equipment is intended to illuminate the means of egress, or means of egress signage, under both normal and emergency conditions.

Equipment may contain both emergency power and lighting capability, or may provide only one of the two functions.

PRODUCT TYPES

This category covers emergency luminaires, exit signs, unit equipment, inverters, central station battery systems, load control relays, and related accessories that directly facilitate or supplement the function of these devices.

This category also includes inverter/charger packs intended for factory or field installation in UL-certified luminaires. These inverter/charger packs have been investigated by UL to determine that when installed in accordance with the manufacturer's instructions they do not adversely affect the operation of the installed luminaire. Electrical ratings, lamp compatibility, and wiring diagrams are marked on the packs and/or identified in the instructions provided. Inverter/charger packs are not suitable for installation in sealed or gasketed compartments unless investigated and marked for such applications.

RATINGS

All products have been investigated for use in dry locations only unless marked as suitable for damp or wet locations. Products marked as suitable for indoor damp or wet locations have not been investigated for UV exposure. All products have been investigated for use in ambient temperatures of 20 – 30°C (68 – 86°F) unless otherwise marked with an extended-use temperature range.

Emergency power equipment with batteries provides 90 minutes (or more, if so marked) of rated operating power for emergency lighting equipment (integral or remote) sufficient to meet the illuminance performance requirements of ANSI/NFPA 101 and the IBC, when installed as part of a facility's emergency lighting system.

Exit signs have been investigated for visibility from 100 ft unless marked with a maximum viewing distance of 50 or 75 ft.

Exit signs investigated for installation near floor level have been subjected to an impact test and are marked "Suitable for Floor Proximity Installation."

RELATED PRODUCTS

Exit signs intended for connection to a single source of power only are covered under Exit Fixtures (FWBO). Exit signs with no connection to a source of electrical power are covered under Exit Signs, Self-luminous and Photoluminescent (FWBX).

Equipment intended to provide light or power when normal (utility) power is not available, but that has not been investigated for compliance with the applicable power or illumination performance requirements of ANSI/NFPA 101 or the IBC, is covered under Lighting and Power Equipment, Auxiliary (OUST).

Kits intended to convert exit signs from one type of internal light source to another are covered under Exit Sign Conversion Kits (FWCF) or Exit Sign Retrofit Kits (GGET).

Emergency lighting and power equipment intended for use on marine vessels is covered under Luminaires, Emergency Lighting, Marine (IGTC).

Equipment intended to transfer utilization equipment from the normal (utility) supply to an emergency supply, and back again, is covered under Automatic Transfer Switches for use in Emergency Systems (WPWR).

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 924, "Emergency Lighting and Power Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Emergency Lighting Equipment" (or "Emer. Light Eq."), "Emergency Power Equipment" (or "Emer. Power Eq.") or "Emergency Lighting and Power Equipment" (or "Emer. Light & Power Eq.").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EMERGENCY LIGHT-EMITTING-DIODE DRIVERS (FTBV)

USE AND INSTALLATION

This category covers light-emitting-diode (LED) drivers with rechargeable battery packs, intended for field or factory installation in or with specifically identified UL-certified luminaires. When installed in or with the identified luminaires in accordance with the manufacturer's instructions, the luminaire complies with the lumen output requirements of ANSI/UL 924, "Emergency Lighting and Power Equipment," and is eligible to serve as part of a facility's emergency lighting system in accordance with ANSI/NFPA 101, "Life Safety Code," Article 700 of ANSI/NFPA 70, "National Electrical Code," and the "International Building Code" (IBC).

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Emergency Light-emitting-diode Drivers (FTBV)—Continued

These emergency LED drivers have been investigated for use with specific luminaires identified either on the product or in the installation instructions, as noted in the Certification Mark. When installed as intended in or with the specifically identified luminaires, these emergency LED drivers provide 90 minutes (or more, if so marked) of illumination sufficient to meet the illumination performance requirements of ANSI/NFPA 101 and the IBC.

These emergency LED drivers are suitable for installation inside or outside the luminaire housing, as noted in the installation instructions.

RATINGS

All products have been investigated for use in dry locations only unless marked as suitable for damp or wet locations. Products marked as suitable for indoor damp or wet locations have not been investigated for UV exposure. All products have been investigated for use in ambient temperatures of 20 – 30°C (68 – 86°F) unless otherwise marked with an extended-use temperature range.

Emergency LED drivers marked as having Class 2 outputs are eligible for field connection in accordance with Article 725 of the NEC.

RELATED PRODUCTS

Emergency battery packs for use with fluorescent luminaires are covered under Emergency Lighting and Power Equipment (FTBR).

ADDITIONAL INFORMATION

For additional information, see Emergency Lighting and Power Equipment (FTBR), Electrical Equipment for Use in Ordinary Locations (AALZ) and Building Materials (AABM).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 924, "Emergency Lighting and Power Equipment," and ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

EMERGENCY LED DRIVER

FOR USE WITH *

Control No.

* [Manufacturer/Model number] LED LUMINAIRE or LED LUMINAIRES IDENTIFIED IN THE MANUFACTURER'S INSTALLATION INSTRUCTIONS

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ENGINE GENERATORS (FTCA)

This category covers electrical generating equipment driven by gasoline, LP-gas, natural gas or diesel fueled internal combustion engines, including microturbines. The products are provided as integrated systems rated 600 V or less and may be intended for portable, permanent or mobile installations. The systems are arranged to facilitate installation and use in unclassified (ordinary) locations in accordance with ANSI/NFPA 70, "National Electrical Code."

ENGINE GENERATORS FOR PORTABLE USE (FTCN)

GENERAL

This category covers internal-combustion-engine-driven generators rated 15 kW or less, 250 V or less, which are provided only with receptacle outlets for the ac output circuits. The generators may incorporate alternating- or direct-current generator sections for supplying energy to battery-charging circuits.

When a portable generator is used to supply a building or structure wiring system:

1. The generator is considered a separately derived system in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).
2. The generator is intended to be connected through permanently installed certified transfer equipment that switches all conductors other than the equipment grounding conductor.
3. The frame of a certified generator is connected to the equipment-grounding conductor and the grounded (neutral) conductor of the generator. When properly connected to a premises or structure wiring system, the portable generator will be connected to the premises or structure grounding electrode for its ground reference.

ENGINE GENERATORS (FTCA)

Engine Generators for Portable Use (FTCN)—Continued

4. Portable generators used other than to power building or structure wiring systems are intended to be connected to ground if required by the NEC.

RELATED PRODUCTS

Engine generators intended for use in recreational vehicles are covered under Engine Generators for Recreational Vehicles (FTCZ).

Engine generators intended for stationary use are covered under Engine Generators (FTSR).

Wind-driven generators are covered under Wind Turbine Generating System Subassemblies (ZGZ).

Motor-generator sets and flywheel energy-storage systems are covered under Motor-Generator Sets (PQYW).

Generators, also referred to as generator heads or alternators, intended for use in an engine generator are covered under Generators (JZGZ).

ADDITIONAL INFORMATION

For additional information, see Engine Generators (FTCA), Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2201, "Portable Engine-Generator Assemblies."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Engine Generator for Portable Use."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ENGINE GENERATORS FOR RECREATIONAL VEHICLES (FTCZ)

GENERAL

This category covers electrical generating equipment driven by gasoline, LP-gas, natural gas or diesel-fueled internal-combustion engines. The systems are intended for installation in recreational vehicles.

RELATED PRODUCTS

Engine generators intended for portable use are covered under Engine Generators for Portable Use (FTCN).

Motor generator sets and flywheel energy storage systems are covered under Motor Generator Sets (PQYW).

Generators, also referred to as generator heads or alternators, intended for use in an engine generator are covered under Generators (JZGZ).

ADDITIONAL INFORMATION

For additional information, see Engine Generators (FTCA), Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1248, "Engine-Generator Assemblies for Use in Recreational Vehicles."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Engine Generator for Recreational Vehicles."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EMERGENCY LIGHTING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FTEV)

USE

This category covers automatic transfer switches designed for control of emergency lighting and power circuits in hazardous locations as required by

EMERGENCY LIGHTING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FTEV)

Articles 500 – 503 and 700 of ANSI/NFPA 70, “National Electrical Code.” The lighting circuit ratings do not exceed 250 V for tungsten lamps. The investigation of automatic transfer switches includes the determination of their suitability for transferring the load from a normal supply circuit to an immediately available emergency supply circuit.

This category also covers unit equipment, but not separate lamp heads or lighting fixtures (luminaires).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 924, “Emergency Lighting and Power Equipment.”

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 844, “Luminaires for Use in Hazardous (Classified) Locations.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Emergency Lighting Equipment for Use in Hazardous Locations.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EMERGENCY LIGHTING EQUIPMENT FITTINGS FOR USE IN HAZARDOUS LOCATIONS (FTGT)

GENERAL

This category covers subassemblies of emergency lighting equipment fittings intended for final assembly into a unit in the field in accordance with the manufacturer’s installation instructions.

Information restricting the use of these fittings is marked on the fitting or provided with the fitting.

The lighting circuit ratings do not exceed 250 V for tungsten lamps.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 844, “Luminaires for Use in Hazardous (Classified) Locations,” in addition to Articles 500 – 503 and 700 of ANSI/NFPA 70, “National Electrical Code.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Emergency Lighting Equipment, Fittings, for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EMERGENCY LIGHTING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (FTHR)

GENERAL

This category covers automatic transfer switches designed for control of emergency lighting and power circuits as required by Articles 500, 505 and 700 of ANSI/NFPA 70, “National Electrical Code.” The lighting circuit ratings do not exceed 250 V for tungsten lamps. The investigation of automatic transfer switches includes the determination of their suitability for transferring the load from a normal supply circuit to an immediately available emergency supply circuit.

This category also covers unit equipment, but not separate lamp heads or lighting fixtures (luminaires).

EMERGENCY LIGHTING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (FTHR)

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 924, “Emergency Lighting and Power Equipment.”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Emergency Lighting Equipment for Use in Hazardous Locations” or “Emergency Fluorescent Lighting Fixture for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ENCLOSURES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (FTQH)

GENERAL

This category covers electrical enclosures employing the flameproof “d” protection technique in accordance with ANSI/NFPA 70, “National Electrical Code.” These enclosures are intended for use in one or more of the following hazardous locations, as indicated on the individual product: Class I, Zone 0, 1 and 2.

Unless otherwise noted in the individual certifications, enclosures are investigated for enclosing electrical equipment intended for connection to circuits having a maximum available fault current of 10,000 rms symmetrical amperes.

This category covers only the enclosures. Devices that may be contained within these enclosures are not covered under this category.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory) and the following additional information:

ENCLOSURE FOR USE IN HAZARDOUS LOCATIONS AS TO EXPLOSION AND FIRE HAZARD ONLY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ENCLOSURES FOR METERING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FTRQ)

GENERAL

This category covers enclosures intended to house low-temperature metering equipment with no normally arcing or sparking parts in the hazardous location classes and groups indicated on the product, and as defined in ANSI/NFPA 70, “National Electrical Code.”

ADDITIONAL INFORMATION

166 ENCLOSURES FOR METERING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FTRQ)

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Enclosure for Metering Equipment for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ENCLOSURES FOR USE IN HAZARDOUS LOCATIONS (FTRV)

GENERAL

This category covers enclosures intended for use in one or more of the following hazardous locations, as indicated on the individual product, in accordance with ANSI/NFPA 70, "National Electrical Code": Class I, Groups A, B, C and D; Class II, Groups E, F and G; and Class II, Groups F and G, Division 2 only.

This category covers only the enclosures. Electrical devices that may be mounted within these enclosures are not covered under this category. Limitations on the maximum interrupting rating of arcing contacts and temperatures are provided on a label secured to the inside of the enclosure.

Unless otherwise noted in the individual certifications, enclosures are investigated for enclosing electrical equipment intended for connection to circuits having a maximum available fault current of 10,000 rms symmetrical amperes.

RELATED PRODUCTS

Certain enclosures in this category have also been investigated for use aboard marine vessels in accordance with United States Coast Guard (USCG) Electrical Engineering Regulations 46CFR110, "General Provisions," 46CFR111, "Electrical Systems - General Requirements," 46CFR112, "Emergency Lighting and Power Systems," and 46CFR113, "Communication and Alarm Systems and Equipment." Such enclosures are identified by a Marine Certification Mark. Enclosures marked "For Use On Vessels Over 65 Feet" have not been subjected to shock and vibration tests. Enclosures that have been subjected to shock and vibration tests are not marked with a vessel length limitation and may be used on any size vessel.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL Subject 2062, "Outline of Investigation for Enclosures for Use in Hazardous (Classified) Locations," is also used to investigate explosion-proof, dust-ignition-proof and dust-tight enclosures.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory) and the following additional information:

ENCLOSURE FOR USE IN HAZARDOUS LOCATIONS AS TO EXPLOSION AND FIRE HAZARD ONLY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ENCLOSURE ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (FTRX)

GENERAL

ENCLOSURE ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (FTRX)

This category covers enclosure bodies, flat, domed or window covers, window assemblies, threaded extensions, actuation mechanisms and similar subassemblies of enclosures. They are intended to be assembled at the factory or in the field to form a complete explosion-proof or dust-ignition-proof enclosure. Restrictions on the use and assembly of these devices are marked on each part.

RELATED PRODUCTS

For additional information, see Enclosures for Use in Hazardous Locations (FTRV).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

ENCLOSURE ACCESSORY FOR USE IN HAZARDOUS LOCATIONS AS TO EXPLOSION AND FIRE HAZARD ONLY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ENCLOSURE ACCESSORIES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (FTRY)

USE

This category covers enclosure bodies, flat, domed or window covers, threaded extensions, actuation mechanisms and similar subassemblies of enclosures. They are intended to be assembled at the factory or in the field to form a complete explosion-proof or dust-ignition-proof enclosure. Restrictions on the use and assembly of these devices are marked on each part.

RELATED PRODUCTS

See Enclosures for Use in Zone Classified Hazardous Locations (FTQH).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

ENCLOSURE ACCESSORY FOR USE IN HAZARDOUS LOCATIONS AS TO EXPLOSION AND FIRE HAZARD ONLY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ENERGY USAGE MONITORING SYSTEMS (FTRZ)

USE

This category covers products intended for use in metering of utility and nonutility electric power. The primary function of these devices is to monitor power consumption on a building main supply or separate branch circuits. These devices may communicate with other devices by means of

power line carrier, satellite/radio frequency, telephone, cable or other means. Devices suitable for outdoor use are so marked.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 916, "Energy Management Equipment."

ADJUNCT SERVICE

UL provides a service for the Classification of watt-hour meters for use in metering of utilities that not only meet the appropriate requirements of UL but also have been investigated in accordance with standards or parts detailed below from the American National Standards Institute (ANSI):

1. ANSI/NEMA C12.1-+, "Code for Electricity Metering"
2. ANSI/NEMA C12.10-+, "Physical Aspects of Watthour Meters"
3. ANSI/NEMA C12.11-+, "Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL (0.6 kV NSV through 69 kV NSV)"
4. ANSI/NEMA C12.20-+, "Electricity Meters - 0.2 and 0.5 Accuracy Classes"

+ Issue date of standard or latest addendum

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Watt-hour Meter," "Energy Usage Monitor" or "Sub-metering Equipment," or other appropriate product name as shown in the individual Listings.

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with one or more of the standards detailed below. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following additional information:

"ALSO CLASSIFIED IN ACCORDANCE WITH *," where "*" is one of the texts detailed below:

1. ANSI/NEMA C12.1-+, Code for Electricity Metering
2. ANSI/NEMA C12.10-+, Physical Aspects of Watthour Meters
3. ANSI/NEMA C12.11-+, Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL (0.6 kV NSV through 69 kV NSV)
4. ANSI/NEMA C12.20-+, Electricity Meters - 0.2 and 0.5 Accuracy Classes

+ Issue date of standard or latest addendum

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ENGINE GENERATORS (FTSR)

GENERAL

This category covers stationary electrical generating equipment driven by gasoline, LP-gas, natural gas or diesel-fueled internal combustion engines.

This category does not cover engine generator assemblies mounted on trailers intended for temporary installation.

This category does not cover engine generator assemblies intended for marine use.

Certified stationary engine generator assemblies are rated 600 V or less and are intended for installation and use in accordance with ANSI/NFPA 70, "National Electrical Code," ANSI/NFPA 37, "Installation and Use of Stationary Combustion Engines and Gas Turbines," ANSI/NFPA 99, "Health Care Facilities," and ANSI/NFPA 110, "Emergency and Standby Power Systems."

Certified stationary engine generator assemblies may be used in emergency and standby power systems, provided the installed system complies with applicable codes.

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2200, "Stationary Engine Generator Assemblies."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word

"LISTED," a control number, and the product name "Stationary Engine Generator Assembly," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CONTROLS FOR STATIONARY ENGINE-DRIVEN ASSEMBLIES (FTPM)

GENERAL

This category covers engine and engine generator control panels and assemblies that operate, control and supervise an engine or engine generator's operational functions.

Unless otherwise indicated in the individual Listings, engine controllers are intended for use with spark-ignition (gasoline or natural gas) or diesel engines.

The electrical equipment covered under this category is intended for use in systems installed in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), including Article 702, and ANSI/NFPA 37, "Installation and Use of Stationary Combustion Engines and Gas Turbines," including Chapter 9.

These units perform primary functions, such as engine control including but not limited to: engine starting, overspeed limiting, fuel-flow control, ignition control, throttle control, engine-temperature control, low-oil cutoff, etc., generator control or stator or rotor control, and/or engine and/or generator monitoring.

These controllers may additionally perform other secondary functions, such as battery charging, generator voltage regulation, power-factor adjustment, transfer switch control, overcurrent (overload) protection, stand-alone and utility interactive protective relay functions (such as over, under, voltage and frequency, phase loss, phase reversal, and loss of synchronization), ground-fault protection, generator rotor and stator field control, thermal protection).

These devices are intended for use in control circuits rated 600 V maximum or measurement circuits rated 1500 V maximum.

These products have been investigated with respect to risk of fire, shock and injury to persons. Where such equipment is included in systems that involve other pieces of equipment or mechanical operations, the investigation of the risk of fire, electric shock and personal injury has included only the equipment specifically noted in the individual Listings. The accuracy of measured quantities has been investigated only when the product has been investigated for protective functions.

A controller that is marked as suitable for use in emergency standby systems in accordance with Article 700 of the NEC is also suitable for use in legally required standby systems in accordance with Article 701 of the NEC, optional standby systems in accordance with Article 702 of the NEC, or standby generators for fire pump applications in accordance with Article 695 of the NEC.

A controller that is marked as suitable for use in legally required standby systems in accordance with Article 701 of the NEC is also suitable for use in optional standby systems in accordance with Article 702 of the NEC.

Instrument transformers are not evaluated as part of the investigation, unless the manufacturer provides the instrument transformer as part of the generator controller.

CODES

The following summarizes and defines the codes shown in the individual Listings.

Primary Function	Code	IEEE C37.2 Device No./Acronym
Engine control (provides engine control functions such as engine starting, fuel, and/or ignition control)	EC	
Generator control (provides control of a generator or generator rotor and stator field)	GC	
Engine generator control (combines engine and generator control functions)	EGC	
Annunciator (provides monitoring of engine and/or generator status through visual and/or audio indicators)	AN	
Secondary Function	Code	
Engine-starting battery charger	BC	—

Controls for Stationary Engine-driven Assemblies (FTPM)–Continued

Secondary Function	Code	IEEE C37.2 Device No./Acronym
Load-shed control	LS	—
Human machine interface	HMI	HMI
Automatic engine start	AES	—
Exercise control	EXC	—
Variable (engine) speed pressure-limit control	VSPLC	90P
(Engine-driven) Fire pump control	FP	—
(Engine) Speed or Frequency matching control	SPC	15
(Engine) Overspeed protection	OSP	12
(Engine) Underspeed protection	USP	14
Engine overtemperature protection	ETP	26
Loss of lubrication protection	LUBP	—
Fire detection (Automatic) fuel shutdown	FDFS	—
(Generator) Automatic voltage regulator	AVR	90V
(Generator) Field current regulator	FCR	90C
(Generator output) Current limiting	CL	90C
(Automatic) Transfer switch control	TSC	83
(Automatic) Paralleling device control	PDC	83
(Generator) Overload protection	OLP	51
(Generator) Short-circuit-current interruption	SCCI	50
(Generator) Overload protection	OLP	51
(Generator) Short-circuit-current interruption	SCCI	50
(Generator) Overcurrent (overload and short circuit) protection	OCP	50/51
(Generator) Overvoltage control/protection	OVP	59
(Generator) Undervoltage control/protection	UVP	27
(Generator) Phase imbalance (loss) control/protection	PSI	47
(Generator) Abnormal frequency (over, under) control/protection	AFC	81
(Generator) Ground-fault current protection	GFP	50G/51G
(Generator) Power factor (leading/lagging) control/protection	PFC	55
(Generator) Field/Rotor/Stator Thermal (overload) protection	TP	49
Co-generation (combined heat and power) control	CHP	—
(Heat recovery medium) Temperature-limit control	TL	23
(Generator) Reverse power protection	RP	32
(Generator) Excitation (over/under) protection	EXP	40
Distributive generation control	DG	—
Synchronization control	SYNC	25
Monitor power, voltage, current, pressure, and/or temperature	MET	MET
Individual alarm signals to indicate an unsafe condition	AS	30 or 74
Emergency standby (generator) applications	EPS	—
(Critical) Data communications device	COM	16
Remote input and/or output	RIO	RIO
Other (function defined in the individual Listing)	O	—

Note: The numbers and acronyms from IEEE C37.2 (2008), “Electrical Power System Device Function Numbers, Acronyms, and Contact Designations,” are provided to supplement the associated code with industry standard device function numbers and acronyms for reference purposes only. Multiple secondary codes may be associated with a single product.

RELATED PRODUCTS

Utility interactive, stand-alone, and multimode inverters and converters intended to provide a primary, secondary, or primary and secondary power source to nonspecific loads in parallel or separate from the utility are covered under Static Inverters, Converters and Accessories for Use in Independent Power Systems (QIKH).

Programmable devices whose primary function is the control of industrial equipment are covered under Programmable Controllers (NRAQ).

Programmable controllers intended for the control of industrial equipment and which include safety-related functions (i.e., functional safety applications) are covered under Programmable Safety Controllers (NRGF).

Primary safety controls intended for programming and monitoring the operation of the burner on gas-, gas-oil-, or oil-fired appliances are covered under Controls, Primary Safety (MCCZ).

Controls for Stationary Engine-driven Assemblies (FTPM)–Continued

Equipment intended for use in applications involving instruments for measurement, recording and/or control of process variables (such as temperature, pressure, flow, etc.) and auxiliary devices used with these instruments, such as sensors, transducers and valve operations in an industrial process application are covered under Process Control Equipment, Electrical (QUYX).

Controls that are operated by a change in liquid level, pressure or temperature intended primarily for use with air conditioning and heating equipment is covered under Controls, Limit (MBPR).

Protective relays of types directly associated with power switchgear in utility substation applications are covered under Protective Relays (NRGU).

Stand-alone battery chargers without engine or generator control functions for automatically controlling and maintaining the charge on batteries used to start internal-combustion engines are covered under Battery Chargers for Engine-driven Emergency and Standby Power System Generators (BBHH), Battery Chargers for Use with Internal-combustion Engines Driving Centrifugal Fire Pumps (QWIR) or Battery Chargers, Automotive Type (BBGQ), as appropriate for the application.

General-use industrial control panels are covered under Industrial Control Panels (NITW).

Engine-driven fire pumps are covered under Internal-combustion Engines for Driving Stationary Fire Pumps (QYLU).

Transfer switches are covered under Automatic Transfer Switches for Use in Optional Standby Systems (WPXT), Automatic Transfer Switches for Use in Emergency Systems (WPWR), Nonautomatic Transfer Switches (WPYV), Meter-mounted Transfer Switches (WPXW), Automatic Transfer Switches Over 600 Volts (WPYC), or Transfer Switches for Use in Fire Pump Motor Circuits (XNVE).

Engine and generator controls intended for use in Class I, Division 2 hazardous (classified) locations are covered under Engine Controls for Use in Hazardous Locations (FTWD) and Ignition Controls for Use in Hazardous Locations (FTWL).

ADDITIONAL INFORMATION

For additional information, see Engine Generators (FTSR), Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL 6200, “Outline of Investigation for Controls for Stationary Engine Driven Assemblies.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Engine Controller,” “Generator Controller,” “Engine Generator Controller,” “Engine Status Annunciator,” “Generator Status Annunciator” or “Engine and Generator Status Annunciator.”

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ENGINE GENERATOR ENCLOSURES, CONSTRUCTION ONLY (FTPP)

USE AND INSTALLATION

This category covers engine generator enclosures (also known as weather housings) investigated for electrical and mechanical construction only. These enclosures are intended to be installed on certified stationary engine generators in the field or in a factory. The enclosure assemblies may include components such as mufflers, lights, heaters, fans, battery chargers, alarms, and other accessories certified to component standards. As these component investigations vary in the type and level of testing to which they are subjected by the component standard, additional testing may be needed as part of the overall engine generator investigation to address their performance in the entire system.

In most cases the combination of a certified engine generator enclosure and an engine generator will require additional investigation and testing to establish the compliance of the overall combined product. Complete overall product assemblies that have been so investigated are identified by the Certification Mark for Engine Generators (FTSR) on the outside of the engine generator enclosure or weather housing.

This category also covers enclosures that have been investigated with particular generators. In this case, the combination of the specific generator and specific enclosure is identified as part of the enclosure certification.

Engine Generator Enclosures, Construction Only (FTPP)—Continued

The final assembled combination of a generator enclosure with an engine generator and other system components is intended to be installed and investigated for compliance with local requirements to applicable product standards and installation codes, including ANSI/NFPA 70, "National Electrical Code."

FACTORS NOT INVESTIGATED

If an enclosure has not been identified for use with specific generators as part of the certification, then the effect of the enclosure on the generator operation has not been investigated. These effects include resistance to the elements and effects of the enclosure on operating temperatures of the generator.

RELATED PRODUCTS

For engine and engine generator control panels and assemblies that operate, control and supervise an engine or engine generator's operational functions, see Engine Generator Controls (FTPM2).

ADDITIONAL INFORMATION

For additional information, see Engine Generators (FTSR), Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2200, "Stationary Engine Generator Assemblies."

UL MARK

The Classification Mark of UL on the outside of the engine generator enclosure assembly is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY*]

AS TO CONSTRUCTION ONLY

Control No.

or

[PRODUCT IDENTITY*]

AS TO CONSTRUCTION ONLY

FOR USE WITH UL LISTED ** ENGINE GENERATOR

Control No.

* ENGINE GENERATOR ENCLOSURE or ENGINE GENERATOR WEATHER HOUSING

** Manufacturer's name and model no(s).

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ENGINE GENERATORS FUELED BY BIOGAS OR RAW NATURAL GAS (FTPU)

GENERAL

This category covers electrical generating equipment driven by internal combustion engines including gas turbines, fueled by biogas, nonsweet or raw sources of natural gas. These gases may contain unknown chemicals, contaminants and energy content. Biogas is produced by the anaerobic decomposition of organic matter. Raw and nonsweet natural gas is often a by-product of oil wells. This equipment has been certified as to risk of electric shock and fire hazards only.

Certified stationary engine generators are rated 600 V or less and are intended for installation and use in accordance with ANSI/NFPA 70, "National Electrical Code," ANSI/NFPA 37, "Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines," and other standards as applicable.

Due to the potential variable nature of these fuel sources, the equipment manufacturer, system designer, installer, Authority Having Jurisdiction, and service personnel need to ensure the equipment is sited, installed, operated and maintained in a manner appropriate for the equipment, installation location and fuel source. Special attention should be placed on the appropriateness of the gas train/fuel system components for the fuel type and the detection of potential gas leakage.

Authorities Having Jurisdiction should be consulted as to conformance with applicable codes.

FACTORS NOT INVESTIGATED

The effects of undefined gases on this equipment have not been investigated. Additionally, the ability or inability of any interposed filtering or scrubbing equipment to mitigate the effects of the undefined gases has not been investigated. This includes, but is not limited to the operation of the equipment, degradation of the equipment, leakage of gases, etc.

RELATED PRODUCTS

Engine Generators Fueled by Biogas or Raw Natural Gas (FTPU)—Continued

Equipment intended to provide a primary, secondary, or primary and secondary power source to nonspecific loads in parallel or separate from the utility is investigated to UL 1741, "Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources," and covered under Static Inverters and Converters for Use in Independent Power Systems (QIKH). Examples of this equipment are utility interactive, stand-alone, multimode inverters or converters, and interconnection system equipment.

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2200, "Stationary Engine Generator Assemblies."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT NAME]*

AS TO RISK OF ELECTRIC SHOCK AND FIRE HAZARDS ONLY

Control No.

* LANDFILL-GAS-FUELED ENGINE GENERATOR, BIOGAS-FUELED ENGINE GENERATOR, LANDFILL GAS MICROTURBINE, DIGESTER GAS MICROTURBINE, or other appropriate product name as shown in the individual Classifications

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EQUIPMENT GROUND-FAULT PROTECTIVE DEVICES (FTTE)

GENERAL

This category covers equipment ground-fault protective devices (EGFPD) that operate to disconnect the electric circuit from the source of supply when ground-fault current exceeds the ground-fault pick-up level marked on the device.

To aid the user in making proper selection of this equipment, the EGFPDs are marked with a ground-fault pick-up level in milliamperes and with a voltage and current rating. The ground-fault pick-up level is limited to the range above 6 mA to 50 mA. These devices are intended to operate upon a condition of excessive ground-fault leakage current from equipment, rather than minimize damage due to arcing faults in services.

EGFPDs are intended to be installed only on grounded alternating-current systems in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

EGFPDs are intended for use in applications where ground-fault protection of equipment is required by the NEC, specifically Sections 426.28 and 427.22, or where such protection is deemed appropriate.

A two-wire device is not suitable for use in a multiwire branch circuit as defined in the NEC.

RELATED PRODUCTS

These devices have not been investigated as to providing electric shock protection for personnel, and they are not intended to be used in place of a ground-fault circuit interrupter (GFCI) where a GFCI is required by the NEC. See Ground-fault Circuit Interrupters (KCXS) for further information.

These devices are not intended to be used in electrical service-entrance equipment where ground-fault sensing and relaying equipment, required by Section 230.95 of the NEC, is used. See Ground-fault Sensing and Relaying Equipment (KDAX) for further information.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1053, "Ground-Fault Sensing and Relaying Equipment." Some requirements are also derived from ANSI/UL 943, "Ground-Fault Circuit-Interrupters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as

**EQUIPMENT GROUND-FAULT PROTECTIVE DEVICES
(FTTE)**

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illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Equipment Ground-fault Protective Device" (or "EGFPD").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**ENGINE CONTROL EQUIPMENT AND
ENGINE GENERATORS FOR USE IN
HAZARDOUS LOCATIONS (FTVV)**

This category covers engine control equipment, which is electrical equipment for use in the control and operation of stationary internal combustion engines and gas turbines in Class I, Division 2 hazardous locations.

This equipment is intended to be installed in accordance with ANSI/NFPA 37, "Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines."

This category also covers engine generators, which are electrical generating equipment driven by gasoline, LP-gas, natural gas or diesel-fueled internal combustion engines or gas turbines for use in Class I, Division 2 hazardous locations.

Listed stationary engine generator assemblies are rated 600 V or less and are intended for installation and use in accordance with ANSI/NFPA 70, "National Electrical Code," and ANSI/NFPA 37. The protection method employed for installations in hazardous locations is Purging and Pressurization in accordance with ANSI/NFPA 496, "Standard for Purged and Pressurized Enclosures for Electrical Equipment."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**ENGINE CONTROLS FOR USE IN
HAZARDOUS LOCATIONS (FTWD)**

USE AND INSTALLATION

This category covers engine controls intended for use with engine-powered electrical generators for use in hazardous (classified) locations. These devices are intended to monitor and control engine functions.

FACTORS NOT INVESTIGATED

This equipment has not been investigated for use with engines or turbines that provide critical functions, such as emergency power or fire protection.

RELATED EQUIPMENT

See Ignition Controls for Use in Hazardous Locations (FTWL).

ADDITIONAL INFORMATION

For additional information, see Engine Control Equipment and Engine Generators for Use in Hazardous Locations (FTVV) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment," ANSI/UL 61010-1, "Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements," or UL 6200, "Outline of Investigation for Controls for Stationary Engine Driven Assemblies."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Engine Control for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**ENGINE CONTROL EQUIPMENT AND ENGINE GENERATORS
FOR USE IN HAZARDOUS LOCATIONS (FTVV)**

**ENGINE GENERATORS FOR USE IN
HAZARDOUS LOCATIONS (FTWG)**

GENERAL

This category covers electrical generating equipment driven by gasoline, LP-gas, natural gas or diesel-fueled internal combustion engines or gas turbines for use in Class I, Division 2 hazardous locations.

Certified stationary engine generator assemblies are rated 600 V or less and are intended for installation and use in accordance with ANSI/NFPA 70, "National Electrical Code," and ANSI/NFPA 37, "Installation and Use of Stationary Combustion Engines and Gas Turbines." The protection method employed for installations in hazardous locations is Purging and Pressurization in accordance with ANSI/NFPA 496, "Purged and Pressurized Enclosures for Electrical Equipment."

Certified stationary engine generator assemblies investigated to ANSI/NFPA 99, "Health Care Facilities Code," or ANSI/NFPA 110, "Emergency and Standby Power Systems," are marked to indicate such usage. This equipment may be used in emergency and standby power systems, provided the installed system complies with applicable codes.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 2200, "Stationary Engine Generator Assemblies."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Stationary Engine Generator Assembly for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**IGNITION CONTROLS FOR USE IN
HAZARDOUS LOCATIONS (FTWL)**

USE AND INSTALLATION

This category covers ignition controls intended for use with stationary internal-combustion engines and gas turbines in Class I, Division 2 hazardous locations. These devices are power supplies that provide a controlled high-voltage output for igniters or other similar spark-producing devices. The igniters or other spark-producing devices are installed in the combustion chamber(s) of the engine or turbine.

This equipment is intended to be installed in accordance with ANSI/NFPA 37, "Installation and Use of Stationary Combustion Engines and Gas Turbines." The input of line-powered equipment is provided with means for connection of one of the wiring methods permitted for Class I, Division 2 hazardous locations in ANSI/NFPA 70, "National Electrical Code." The ignition output (engine or turbine wiring) of all equipment is provided with means for connection of one of the wiring methods permitted in ANSI/NFPA 37.

The high-output-voltage levels of this equipment can produce electrical shock. Care should be taken to follow the installation instructions provided with the equipment, including proper grounding of the equipment and proper output connections. Operating personnel should be carefully instructed regarding its correct operation and maintenance.

UNEVALUATED FACTORS

This equipment has not been investigated for use with engines or turbines that provide critical functions, such as emergency power or fire protection.

ADDITIONAL INFORMATION

For additional information, see Engine Control Equipment for Use in Hazardous Locations (FTVV) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 1012, "Power Units Other Than Class 2."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illus-

ENGINE CONTROL EQUIPMENT AND ENGINE GENERATORS FOR USE IN HAZARDOUS LOCATIONS (FTVV)

Ignition Controls for Use in Hazardous Locations (FTWL)—Continued

trated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ignition Control for Use in Hazardous Locations."

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EXIT SIGNS AND EXIT APPLIANCES (FUDQ)

This category covers exit signs and exit appliances as identified by the following specific product categories.

The installation and use of these devices are specified in NFPA 101, "Code for Safety to Life from Fire in Buildings and Structures."

These products have not been investigated with reference to fire resistance. Related devices that have been evaluated for fire resistance are covered in the Fire Resistance Directory.

EXIT DOORS (FUXV)

USE AND INSTALLATION

The category covers sliding, swinging and bifold doors incorporating a panel that can be manually opened to permit exit travel. Rules covering installation and use are contained in ANSI/NFPA 101, "Life Safety Code." The assembly consists of a frame, doors and necessary hardware.

This category does not cover the electrical and pneumatic door operators or the glass portions of the doors, partitions, panels or sections. Electrical and pneumatic door operators are covered under Door, Drapery, Gate, Louver, and Window Operators and Systems (FDDR).

RELATED PRODUCTS

See Fire Doors (GSNV).

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1336, "Outline of Investigation for Exit Doors."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Sliding Exit Door," "Swinging Exit Door," "Bifold Exit Door" or "Exit Door."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PANIC HARDWARE (FVSR)

USE AND INSTALLATION

This category covers devices intended for mounting on or integral with outward-swinging doors to facilitate the safe egress of persons in case of emergency.

The installation and use of doors on which this hardware is mounted is intended to be in accordance with ANSI/NFPA 101, "Life Safety Code."

RELATED PRODUCTS

Assemblies investigated for fire resistance are covered under Fire-exit Hardware (GXHX).

Assemblies investigated with reference to access control system units are covered under Special Locking Arrangements (FWAX) or Controlled Exit Panic Devices (FULA).

ADDITIONAL INFORMATION

For additional information, see Exit Signs and Exit Appliances (FUDQ) and Building Materials (AABM).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 305, "Panic Hardware."

Products additionally investigated to ANSI/BHMA A156.3-(*), "Exit Devices," are indicated in the individual certifications.

(*) Denotes the date of the standard to which the product was investigated.

Panic Hardware (FVSR)—Continued

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Panic Hardware."

Products that have additionally been determined by UL to be in accordance with ANSI/BHMA A156.3-(*) may bear an additional reference: "Grade 1, Grade 2 or Grade 3." If the complete Listing Mark is not applied to the center case so as to be visible after installation, then, in addition, the UL symbol plus the letter "p" (for Panic) adjacent to it are both stamped on the device.

(*) Denotes the date of the standard to which the product was investigated.

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EXIT FIXTURES (FWBO)

GENERAL

This category covers internally illuminated exit signs intended to be connected to a single source of power in accordance with ANSI/NFPA 70, "National Electrical Code," ANSI/NFPA 101, "Life Safety Code," ANSI/NFPA 5000, "Building Construction and Safety Code," and/or the "International Building Code."

RATINGS

Exit fixtures have been investigated for use in dry locations only unless marked as suitable for damp or wet locations. Products marked as suitable for indoor damp or wet locations have not been investigated for UV exposure. All products have been investigated for use in ambient temperatures of 20–30°C (68–86°F) unless otherwise marked with an extended use temperature range.

Exit fixtures have been investigated for visibility from 100 ft.

RELATED PRODUCTS

Exit signs intended for connection to more than one source of power, or with an integral backup power source, are covered under Emergency Lighting and Power Equipment (FTBR). Exit signs with no connection to a source of electrical power are covered under Exit Signs, Self-luminous and Photoluminescent (FWBX).

Kits intended to convert exit signs from one type of internal light source to another are covered under Exit Sign Conversion Kits (FWCF) or Exit Sign Retrofit Kits (GGET).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Building Materials (AABM).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 924, "Emergency Lighting and Power Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Exit Fixture."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EXIT SIGNS, SELF-LUMINOUS AND PHOTOLUMINESCENT (FWBX)

USE AND INSTALLATION

This category covers exit signs that utilize a nonelectrical illumination power source, including exit signs containing self-luminous gases or with a photoluminescent surface activated by external illumination. These signs are intended for installation in accordance with ANSI/NFPA 101, "Life Safety Code," the "International Building Code," and other codes governing the marking of the means of egress.

These exit signs have been investigated for use in dry locations only unless marked as suitable for damp or wet locations. Those marked as

EXIT SIGNS, SELF-LUMINOUS AND PHOTOLUMINESCENT (FWBX)

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suitable for indoor damp or wet locations have not been investigated for UV exposure. All exit signs have been investigated for use in ambient temperatures of 20 – 30°C (68 – 86°F) unless otherwise marked with an extended use temperature range.

Exit signs that have been investigated for mounting near the floor are marked, where visible after installation, "Suitable for Floor Proximity Installation" or equivalent wording.

These exit signs have been investigated for visibility from 100 feet unless marked, where visible after installation, with a maximum viewing distance of 50 or 75 feet.

EXTERNAL ILLUMINATION

Exit signs whose visibility is dependent on external illumination (such as photoluminescent signs) are intended for installation only where such external illumination is deemed reliable and sufficient by the Authority Having Jurisdiction and where the lighting controls are accessible only to authorized personnel. Where compliance with the visibility requirements requires external illumination greater than 1 ft-c, these signs are marked, where visible after installation, for a minimum 5 ft-c illumination, measured on the face of the sign. If specific type(s) of lighting are needed to achieve the required visibility, the lighting type is also marked on the sign where visible after installation.

REPLACEMENT DATE

Exit signs whose visibility is expected to decline over time (such as those containing self-luminous gases) are marked, where visible after installation, with a replacement date.

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 924, "Emergency Lighting and Power Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Self-luminous Exit Sign" or "Photoluminescent Exit Sign," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EXIT SIGN CONVERSION KITS (FWCF)

GENERAL

This category covers exit sign conversion kits, which are parts and/or subassemblies intended for field installation in specific certified exit fixtures (see Exit Fixtures [FWBO]) or exit lights (see Emergency Lighting and Power Equipment [FTBR]). They convert the light source from one type to another (e.g., incandescent to LED), primarily for energy-saving purposes. They have been investigated to determine that when used in accordance with the manufacturer's instructions, they do not adversely affect the operation of the complete exit sign. Their use is subject to the conditions indicated on the installation instructions provided with the kit.

Conversion kits are of one of the following type designations:

- **Type EFS (Exit Fixture Specific)** — A conversion kit intended for use with one or more specific exit fixture(s) identified by manufacturer and catalog number on the kit and in the installation instructions.
- **Type ELS (Exit Light Specific)** — A conversion kit intended for use with one or more specific exit fixture(s) identified by manufacturer and catalog number on the kit and in the installation instructions.

These kits are intended for installation into UL-certified products that bear the product identity "Exit Fixture" (for Type EFS) or "Emergency Lighting Equipment" (for Type ELS) as part of the Certification Mark.

Exit sign conversion kits are intended for use in indoor, dry locations unless marked "Suitable for Wet Locations," "Suitable for Indoor Wet Locations" or "Suitable for Damp Locations."

Exit sign conversion kits containing fluorescent or electroluminescent lamps and marked as being suitable for damp or wet locations are for use in an ambient temperature not less than that marked on the product.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 924, "Emergency Lighting and Power Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and

EXIT SIGN CONVERSION KITS (FWCF)

Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**EXIT SIGN CONVERSION KIT, TYPE +
FOR USE ONLY WITH EXIT ++ MODEL *
MANUFACTURED BY [Manufacturer's Name]
Control No.**

+ "EFS" or "ELS"

++ "FIXTURE" (for Type EFS) or "LIGHT" (for Type ELS)

* Additional model/manufacturer combinations may be noted

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EXIT FIXTURE TO EXIT LIGHT CONVERSIONS, RETROFIT (FWCN)

GENERAL

This category covers exit fixture to exit light conversions, which are parts and/or subassemblies intended for field installation in specific certified exit fixtures identified by catalog numbers and company name. They are retrofit devices to convert specific exit fixtures to exit lights with integral battery providing emergency power, and may also convert the light source from one type to another (e.g., incandescent to light-emitting diodes) when installed in accordance with the manufacturer's instructions.

These conversions have been investigated to determine that when used in accordance with the manufacturer's instructions, the converted exit fixture complies with the applicable requirements for exit lights.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Building Materials (AABM).

REQUIREMENTS

The basic standard used to investigate the exit fixture to exit light conversions is ANSI/UL 924, "Emergency Lighting and Power Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**EXIT FIXTURE TO EXIT LIGHT CONVERSIONS, RETROFIT
FOR USE ONLY WITH EXIT FIXTURE
MODEL ____ MANUFACTURED BY ____**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EXIT SIGNS AND EXIT APPLIANCES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (FWDD)

EXIT SIGNS AND MARKERS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (FWDJ)

GENERAL

This category covers exit signs and markers intended for installation in accordance with ANSI/NFPA 101, "Life Safety Code," and other codes governing the marking of the means of egress.

Exit signs that do not comply with the visibility requirements from 100 ft are marked with a maximum viewing distance of 50 or 75 ft, and are intended only for installation in corridors or rooms where the distance to the exit sign cannot exceed the marked maximum distance.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 924, "Emergency Lighting and Power Equipment."

EXIT SIGNS AND EXIT APPLIANCES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (FWDD)

Exit Signs and Markers for Use in Zone Classified Hazardous Locations (FWDJ)—Continued

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Exit Sign for Use in Hazardous Locations" or "Exit Marker for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EXIT SIGN RETROFIT KITS (GGET)

USE AND INSTALLATION

This category covers exit sign retrofit kits, which are parts and/or subassemblies intended for field installation in certified Exit Fixtures (FWBO) or certified Exit Lights (FTBR), employing not more than two light sources. They convert the light source from one type to another (e.g., incandescent to LED), primarily for energy-saving purposes. They have been investigated by UL to verify that the converted exit sign retains visibility comparable to and does not otherwise adversely affect the operation of the original sign. Their use is subject to the conditions indicated on the installation instruction provided with the kit.

Retrofit kits are one of the following type designations:

Type EFG (Exit Fixture General) — A retrofit kit intended for use only in single or double faced stencil exit fixtures having a legend not exceeding 6 in. (152 mm) in height. Replacement diffusers are included. Type EFG kits are suitable for use with UL-certified exit fixtures of the following interior dimensions: 6-1/4 to 8-7/8 in. high, 9-1/2 to 13-7/16 in. wide, and 7/8 to 3-1/4 in. deep.

Type EFI (Exit Fixture Independent) — A retrofit kit that includes a light source, light reflecting media enclosure, diffuser, legend, and two directional indicators, intended to retrofit any UL-certified exit fixture having a legend not exceeding 6 in. (152 mm) in height. Type EFI kits are self-contained assemblies that are independent of the original exit fixture except for mechanical support and electrical supply.

Type ELG (Exit Light General) — Same as Type EFG except intended for use only in UL-certified exit lights, which are energized by an ac power source in the normal mode and by an internal or external dc power source in the emergency mode.

Type ELI (Exit Light Independent) — Same as Type EFI except intended for use certified exit lights energized by an ac power source in the normal mode and by an internal or external dc power source in the emergency mode.

Exit sign retrofit kits are intended for use in indoor, dry locations unless marked "Suitable for Wet Locations," "Suitable for Indoor Wet Locations" or "Suitable for Damp Locations" (see FTBR).

Exit sign retrofit kits containing fluorescent or electroluminescent lamps and marked as being suitable for damp or wet locations are for use in an ambient temperature not less than that marked on the product.

These kits are intended for installation into UL-certified products that bear the product identity of "Exit Fixture" (for Types EFG and EFI) or "Emergency Lighting Equipment" (for Types ELG and ELI) as part of the Certification Mark.

These devices have not been investigated as replacement light sources in edge-illuminated exit signs.

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 924, "Emergency Lighting and Power Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

EXIT SIGN RETROFIT KITS (GGET)

EXIT SIGN RETROFIT KIT

TYPE +

FOR USE ONLY WITH EXIT ++ MODEL *

MANUFACTURED BY _____

Control No.

+ **EFG, EFI, ELG or ELI**
 ++ **FIXTURE** (for Types EFG and EFI) or **LIGHT** (for Types ELG and ELI)

* Additional model/manufacturer combinations may be noted

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FACTORY AUTOMATION EQUIPMENT (GPNY)

USE AND INSTALLATION

This category covers production equipment for attended and unattended assembly of products and subassemblies. This equipment is designed to be programmed for a specific manufacturing application, such as assembly of components, packaging, sorting, or counting of parts, or hole punching or cutting. The equipment may also incorporate manufacturing processes involving heating or cooling, drying, or gluing of parts.

This equipment is intended to be installed in accordance with ANSI/NFPA 79, "Electrical Standard for Industrial Machinery," and Article 670 of ANSI/NFPA 70, "National Electrical Code."

SPECIAL CONSIDERATIONS

This equipment is not intended for the handling of hazardous materials in unattended applications, or intended for fire protection service.

RELATED PRODUCTS

Robotics and associated control equipment are covered under Robots and Robotic Equipment (TETZ).

Industrial control panels are covered under Industrial Control Panels (NITW).

Equipment intended primarily for measurement of physical or chemical properties of materials, measurement of the functional performance of a piece of equipment, qualitative or quantitative constituent analysis of substances, or preparation of materials for further analysis or measurements is covered under Laboratory Use Electrical Equipment (OGTK).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2011, "Outline of Investigation for Factory Automation Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Factory Automation Equipment."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FAN PARTS (GPPF)

USE

This category covers fans and blowers for use in commercial and industrial applications intended to move air for the purposes of air circulation or ventilation. These products are investigated as complete assemblies but are certified as fan heads and fan stands/mounting assemblies with unique model designations. This category covers commercial/industrial fan head assemblies, pedestals, wall-mounting brackets and ceiling-mounting brackets.

This category does not cover fans intended for household or residential use, motors, blade assemblies, fan guards or grills.

PRODUCT MARKINGS

Fan parts covered under this category are marked "For Commercial or Industrial Use Only."

Fan heads covered under this category are marked "CAUTION: To Reduce the Risk of Personal Injury, Use Only With Stand/Mounting Assembly Models ____, Manufactured by ____."

Fan stands/mounting assemblies covered under this category are marked "CAUTION: To Reduce the Risk of Personal Injury, Use Only With Fan Head Assembly Model ____, Manufactured by ____."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 507, "Electric Fans."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fan Part," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FANS, CEILING SUSPENDED (GPRT)**GENERAL**

This category covers:

Ceiling-suspended fans intended to be mounted to a ceiling outlet box or ceiling building structure, and whose blades rotate below the ceiling to move air for the purpose of air circulation.

Light kits intended for use with ceiling-suspended fans.

Ceiling-suspended fans and accessories intended for permanent installation are provided with means for connection to permanent wiring systems.

This category does not cover ceiling-suspended fans intended to be used in hazardous (classified) locations as defined by ANSI/NFPA 70, "National Electrical Code," or intended to be installed over solvents or chemically flammable liquids or vapors or located in a chemically corrosive environment.

PRODUCT MARKINGS

Ceiling-suspended fans intended for mounting beneath a ceiling structure, such as provided on porches or patios, have been subjected to a water-spray test and are marked as being acceptable for such use.

Ceiling-suspended-fan light kits are provided with a marking on the light kit, on the packaging carton, and in the instructions to indicate the fan models with which they are suitable.

RELATED PRODUCTS

Fan-speed controllers for use with fans are covered under Fan-speed Controllers (GQHG).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 507, "Electric Fans."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ceiling Fan," "Ceiling Suspended Fan" or "Fan Accessory," or other appropriate product name as shown in the individual Listings.

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FANS, ELECTRIC (GPWW)**GENERAL**

This category covers:

Fans and blowers intended to move air for the purpose of air circulation, ventilation, exhaust, blending or recirculation
Dryer-type fans used for drying carpets or floors
Residential rangehoods for permanent connection to the power supply or for cord connection to the power supply, remote blowers intended

for residential cooking-area exhaust, and self-contained downdraft ventilators

Low-pressure fan-type inflators not intended for use with inflatable bouncing toys or similar children's products.

This category does not cover:

Fans intended to be used in hazardous (classified) locations as defined by ANSI/NFPA 70, "National Electrical Code" (NEC), or intended to be installed over solvents or chemically flammable liquids or vapors or located in a chemically corrosive environment

Air heaters incorporating fans, heating-ventilating units, or blowers comprised of such equipment as furnaces, mechanical-refrigeration equipment or air conditioners

Fans and accessories intended for permanent installation are provided with means for connection to permanent wiring systems.

These fans have not been investigated for installation in fire walls or from the standpoint of their effect on venting in case of fire. Their location should be determined after consultation with Authorities Having Jurisdiction.

These fans have not been investigated for installation or use in plenum space or "other spaces used for environmental air," as defined by the NEC.

Fans and accessories intended for use over cooking equipment are investigated to determine the effect of grease on electrical parts. These units are for use over residential gas and electric ranges or ovens only and include hood fans intended for use over (but not mounted directly on) ranges, separate hoods provided with lights or other wiring and intended for use over ranges in conjunction with wall or ceiling insert fans, and oven ventilators for use over wall insert ovens.

Fans intended for use over eye-level ranges have been investigated for use when mounted separately above a representative eye-level range.

Some wall-insert and ceiling-insert fans have been investigated for use in conjunction with separate hoods over cooking equipment (see above) and are so marked.

Fans intended for mounting directly on cooking equipment are investigated in conjunction with the cooking appliance and certified as a part of the accessory to the cooking appliance.

Filters provided on fans intended for use over cooking equipment are investigated with respect to flammability and smoke propagation.

Fans installed in an area in close proximity to a stove, range or oven where fumes, grease-laden air or the like may be present and intended to discharge air away from the cooking area are intended to be installed in such a manner as to discharge the air to the exterior of the building and not into concealed walls or ceiling spaces or into the attic. Ductless fans intended for use in cooking areas are not required to discharge air to the building exterior.

Ventilating hood fan shelves intended for use over ranges and incorporating a shelf or a compartment to accommodate a microwave oven are marked for such use.

Except for fans over gas ranges and ovens, none of the fans covered under this category have been investigated for use over cooking appliances that use fuel.

Although ceiling-insert fans, wall-insert fans, and ceiling-insert fan/light combinations employ an internal plug-and-receptacle connection for the motor and light, they are not considered cord-and-plug connected to the source of supply. These internal connections are provided to facilitate rough-in installation of the permanently-wired housing while protecting electrical components (motor and light) until the finishing stage.

PRODUCT MARKINGS

Fans intended for use in barns, poultry houses, dairy barns or the like, as covered by Article 547 of the NEC, are marked "For Use in Agricultural Buildings" or with an equivalent statement.

Ceiling-insert fans, wall-insert fans, and ceiling-insert fan/light combinations marked "Acceptable for use over a bathtub or shower when installed in a GFCI protected branch circuit" are intended for use anywhere within a bathroom ceiling surface, including over bathtubs, showers, or within the zone above the bathtub and shower area as defined by Article 410 of the NEC. These products are investigated to determine the effects of moisture (dampness or wetting), such as shower spray. Products without this marking are intended for use anywhere within a bathroom ceiling surface, excluding the area directly above the footprint of the bathtub or shower.

Fans intended for mounting beneath a ceiling structure, such as provided on porches or patios, have been subjected to a rain test and are marked as being acceptable for such use.

Fans intended for use where they will be exposed to weather are investigated to determine the effect of rain on electrical components and are marked "Outdoor Use." Roof-mounted fans are investigated to determine the effect of rain on electrical components, but are not required to be marked for outdoor use. Gable-mounted attic fans are normally installed with shutters and are not subjected to a rain test; similarly, wall insert fans are not subject to a rain test, if marked to indicate that shutters are to be provided. Fans intended for mounting in interior walls or ceilings are marked to indicate the intended use, unless the design is such as to make the intended method of installation obvious.

Fans intended for use in damp-location cooking areas have been subjected to a water spray test and are marked "Suitable for use in damp locations when installed in a GFCI protected branch circuit."

Ceiling-insert fan/light combinations are not intended for use in an insulated ceiling unless marked "Type IC - Inherently Protected" or "Type IC - Thermally Protected."

When an appliance consists of two or more subassemblies shipped separately, each subassembly or packaging is marked to indicate those other subassemblies that may be used to complete an assembly, if the installation is not obvious.

RELATED PRODUCTS

Fans and blowers intended to move heated or conditioned air are covered under Ventilators, Power (ZACT).

Fans that include filters or means to control humidity or cool air are covered under Air Filtering Appliances (AEDX), Humidifiers (AHIV) or Evaporative Coolers (AGNY).

Hand dryers incorporating heaters are covered under Heaters, Specialty (KSOI).

Accessory kits to adapt a rangehood intended for permanent connection to the power supply to a cord-connected rangehood are covered under Rangehood Cord-connection Kits (GQFM).

Rangehoods and power ventilators intended for commercial applications are covered under Power Ventilators for Commercial Kitchen Exhaust (YZHW), Exhaust Hoods Without Exhaust Dampers (YYCW), Exhaust Hoods with Exhaust Dampers (YXZR) and Hoods/Recirculating Systems for Use with Specified Commercial Cooking Appliances (YZCI).

Microwaves employing cooking-area ventilation are covered under Microwave Cooking Appliances (KQSQ).

Compressor-type inflators are covered under Compressors, Vacuum Pumps and Paint Sprayers (QDGS).

Fan-type deodorizers and fan-type air fresheners are covered under Deodorizers and Air Fresheners (EOGX).

Ionizers and fans employing ionizers are covered under Ion Generators (OETX).

Fans employing electrostatic air cleaners are covered under Electrostatic Air Cleaners (AGGZ).

Fans intended to be mounted to a ceiling outlet box or ceiling building structure and whose blades rotate below the ceiling to move air are covered under Fans, Ceiling Suspended (GPRT).

Light kits for ceiling-suspended fans are covered under Fans, Ceiling Suspended (GPRT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 507, "Electric Fans."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fan," "Electric Fan" or "Fan Accessory," or other appropriate product name as shown in the individual Listings.

The Listing Mark for this category requires the use of a holographic label.

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RANGEHOOD CORD-CONNECTION KITS (GQFM)

USE AND INSTALLATION

This category covers rangehood cord-connection kits intended to adapt specific rangehoods for cord connection to the power supply. These rangehood cord-connection kits are limited to installation with specific makes and models of rangehoods as indicated on the rangehood cord-connection-kit packaging and in the installation instructions.

ADDITIONAL INFORMATION

See Fans, Electric (GPWV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 507, "Electric Fans."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification

Rangehood Cord-connection Kits (GQFM)–Continued

and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

RANGEHOOD CORD-CONNECTION KIT FOR USE WITH LISTED RANGEHOOD SPECIFIED IN MARKINGS ON THE PACKAGING Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FAN-SPEED CONTROLS (GQHG)

GENERAL

This category covers semiconductor, capacitive type, and inductive-type fan-speed controls for regulating the speed of the motor of a fan. In some cases the devices also control the starting and stopping of the fan motor.

Fan-speed controls are intended for use only with single or multiple fans in parallel where the total controlled load is not in excess of the rating of the controller.

These products may be outlet box-mounted, cord-and-plug connected, or intended for mounting in the fan canopy. Cord-and-plug-connected controls are intended for control of cord-and-plug-connected fans only.

PRODUCT MARKINGS

Controls marked "Ceiling Fan" or "Paddle Fan" are intended only for use with one or more fans of this type.

Controls marked "General Use" are intended to be used with any motor-driven fan, including ceiling-suspended fans, as permitted by instructions provided with the fan.

Fan-speed controls using semiconductors for regulation are marked "Solid-State Fan Speed Control."

Fan-speed controls using capacitors or inductors for speed control may be marked to indicate the method of speed control.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1917, "Solid-State Fan Speed Controls."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fan Speed Control" or "Solid-State Fan Speed Control."

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FANS, ELECTRIC FOR USE IN HAZARDOUS LOCATIONS (GQJA)

GENERAL

This category covers stationary and portable electric fans. Fans are provided with motors certified for the location in which the fan will be used.

Portable fans are sealed from terminal compartments which have provision for connection of three-conductor, flexible, extra-hard-usage cord having a grounding conductor. Connection of portable fans to supply lines require the use of receptacles with plugs or receptacles with plugs interlocked with snap switches, or their equivalent, certified for the specified hazardous locations. The flexible cord connected to the units should be frequently examined and replaced when necessary. Terminal connections should be properly made and maintained.

Authorities Having Jurisdiction should be consulted with regard to conditions under which portable equipment is permitted for use. It is recognized that portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

PRODUCT CATEGORIES BY CATEGORY CODE

FANS, ELECTRIC FOR USE IN HAZARDOUS LOCATIONS
(GQJA)

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REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Fan for Use in Hazardous Locations" or "Portable Electric Fan for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FANS, PORTABLE PNEUMATIC FOR
USE IN HAZARDOUS LOCATIONS
(GQJX)

GENERAL

This category covers portable pneumatic fans for use in hazardous locations. Air-supply lines should be made of electrically conductive material in accordance with ANSI/NFPA 77, "Recommended Practice on Static Electricity," and/or any other applicable code. Ground terminal connections should be properly made and maintained.

Authorities Having Jurisdiction should be consulted with regard to conditions under which this portable equipment will be permitted for use. Portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AALZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Pneumatic Fan for Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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FC CABLE (GQKT)

USE AND INSTALLATION

This category covers Type FC cable which is an assembly of three or four parallel 10 AWG special stranded copper wires formed integrally with an insulating material web. Type FC cable is intended for installation in accordance with Article 322 of ANSI/NFPA 70, "National Electrical Code."

The cable is marked with the size of the maximum branch circuit to which it may be connected, the cable type designation, manufacturer's identification, maximum working voltage, conductor size and temperature rating.

Type FC cable is not intended to be installed outdoors or in wet or damp locations unless identified for use in wet locations.

A marking accompanying the cable on a tag or reel indicates the special metal raceways and specific FC cable fittings with which the cable is intended to be used. Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector and others concerned with the installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illus-

FC CABLE (GQKT)

trated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "FC Cable."

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FC CABLE FITTINGS (GQRS)

USE AND INSTALLATION

This category covers power tap and cable termination fittings intended for use with FC cable installed in accordance with ANSI/NFPA 70, "National Electrical Code."

A fitting is suitable for use only with cable identified for use with that fitting.

Installation instructions are provided by the manufacturer.

ADDITIONAL INFORMATION

For additional information, see FC Cable (GQKT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 498, "Attachment Plugs and Receptacles," and ANSI/UL 486A-486B, "Wire Connectors."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "FC Cable Fitting," "Power Tap" or "Cable Feed," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FENCE CONTROLLERS, ELECTRIC
(GQYR)

GENERAL

This category covers electric-fence controllers intended for use with conductive fences installed in rural locations, insulated from ground, for the containment of livestock. The fire and electric shock hazards incident to the use of these fences have been reduced to a reasonable degree, provided installation and operation are in accordance with the nameplate information.

Requirements for the operation of electric-fence controllers provide for intermittent energizing of the fence when currents of sufficient magnitude to prevent voluntary breaking of contact are involved. An "off" period between impulses is provided in which voluntary muscular control can be regained and contact with the fence broken. It should be recognized that failure to break contact with the fence, due to other than electrical causes, may dangerously increase the hazard related to the use of these devices.

Electric-fence controllers are classified according to the source of supply of the unit and the intended installation.

This category does not covers electric-fence controllers intended for security purposes.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 69, "Electric-Fence Controllers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Fence Controller."

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FIRE DOORS (GSNV)

GENERAL

This category covers fire doors certified in the following categories: Access, bullet-resisting, chute, curtain, dumbwaiter, freight elevator, passenger elevator, rolling steel, service counter, sliding, special purpose, swinging, and swinging, positive-pressure-tested doors.

Fire doors are intended for installation in conjunction with fire door frames, hardware, and/or other accessories that together form a fire door assembly, which provides the degree of fire protection to the opening. For certifications of fire doors, see:

- Access-type Fire Doors (GSOT)
- Bullet-resisting-type Fire Doors (GSOX)
- Chute-type Fire Doors (GSPR)
- Curtain-type Fire Doors (GSQX)
- Dumbwaiter-type Fire Doors (GSRV)
- Freight-elevator-type Fire Doors (GSST)
- Freight-elevator-type Fire Door Retrofit Parts (GSSZ)
- Passenger-elevator-type Fire Doors (GSUX)
- Rolling Steel Fire Doors (GSVV)
- Service-counter-type Fire Doors (GSWT)
- Sliding-type Fire Doors (GSXV)
- Special-purpose Fire Doors (GSXZ)
- Swinging-type Fire Doors (GSYX)
- Finishers of Fire Doors (GSZC)
- Swinging-type Fire Door Retrofit Parts (GSZG)
- Swinging-type Fire Doors, Positive-pressure Tested (GSZN)

Fire doors are designed for the protection of openings in walls and partitions against fire when installed in accordance with ANSI/NFPA 80, "Fire Doors and Other Opening Protectives."

The rating of 4-, 3-, 1-1/2-, 1-, 3/4-h, 30 or 20 minutes indicates the duration of exposure to fire. As indicated in the individual certifications, some manufacturers can furnish sliding- and swinging-type doors that are Classified for 4 hours.

Classification Marks with 3 h ratings have replaced the "Fire Door for Opening in Fire Wall" and "A" Classification Marks; the 1-1/2 h and 1 h Classification Marks have replaced the "Fire Door for Opening in Vertical Shaft" and "B" Classification Marks; the 3/4 h Classification Marks have replaced the "Corridor and Room Partition" and "C" Classification Marks; the 1-1/2 h Classification Marks have also replaced the "Fire Door for Opening in Exterior Wall," the "Fire Shutter for Opening in Exterior Wall" and the "D" Classification Marks; the 3/4 h Classification Marks have replaced the "Fire Door for Opening to Exterior Fire Escape" and "E" Classification Marks.

Some fire doors contain a temperature-rise rating in the Classification Mark. This rating is intended for use in determining compliance with the temperature-rise requirements contained in the "International Building Code," ANSI/NFPA 101, "Life Safety Code," and/or ANSI/NFPA 5000, "Building Construction and Safety Code." A temperature-rise rating of 250°F, 450°F or 650°F applies to the temperature rise developed on the unexposed surface of the door after the first 30 min of fire exposure. Classification Marks that do not indicate a temperature rise are for doors which develop a temperature rise in excess of 650°F on the unexposed surface of the door. All doors with glass lights in excess of 100 sq in. are not eligible for a temperature-rise rating. Doors with glass light panels of 100 sq in. or less carry the same rating as similar doors without glass vision panels.

Glazing materials covered under this category are Classified as to fire resistance only. The glazing materials are intended to be installed in the fire doors in accordance with ANSI/NFPA 80 and the installation instructions provided by the manufacturer of the door, glass light frame or glazing material. See Fire Door Glass Light Frames (GVVX) and Fire-protection-rated Glazing Materials (KCMZ).

A door prepared at the factory for a glass light includes the glazing members (frame) but normally does not include the glazing itself. Glazing materials are usually provided by other than the door manufacturer and installed at the time of the door installation.

The protection of an opening depends not only upon the use of fire doors, but also upon the use of Listed door frames and other Listed accessories as specified under each door type. Prospective users should first ascertain from Authorities Having Jurisdiction which door type, mounting, Listed hardware, Listed door frame, and Listed closing mechanism are acceptable for a specific location.

While doors of the freight elevator type, rolling steel type, and sliding or swinging steel-covered composite type, hollow-metal type, metal-clad (Kalamein) type, sheet-metal type and tin-clad type exceeding the sizes recorded in the tabulations under their respective types have not been subjected to fire tests, a Certificate for Oversized Fire Door can be provided for door assemblies in compliance (except for size), with all requirements for design, materials and construction. The Oversize Certificate can be a separate certificate or a label certificate affixed to the door assembly.

Similarly, an attached or separate Certificate for Passenger Elevator Fire Door Frame Assemblies incorporating a transom panel can be provided

when such frame/transom panel assemblies, designed for use with specific Classified Passenger Elevator Fire Doors and Listed Passenger Elevator Fire Door Hardware, exceed the maximum heights which have been subjected to Standard Fire Tests. As with the oversize doors described above, prospective users should first ascertain from the Authority Having Jurisdiction whether the oversize frame assembly is acceptable for any given location.

Authorities Having Jurisdiction should be consulted as to the particular requirements covering the installation and use of these products.

POSITIVE-PRESSURE FIRE DOORS

To assist in selecting components of fire door assemblies tested under positive pressure, eight categories, identified as A through J, were established.

Category A Doors — A fire door that does not require the addition of other components such as edge seals to comply with positive-pressure requirements. It also includes doors that have been prepared with edge seals in the manufacturing process. See Swinging-type Fire Doors, Positive-pressure Tested (GSZN) for the individual certifications.

Category B Doors — A fire door that requires the addition of an edge seal to comply with the positive-pressure requirements. The edge seals are added to the door edge or to the frame. See Swinging-type Fire Doors, Positive-pressure Tested (GSZN) for the individual door certifications. See Gasketing and Edge-sealing Materials for Fire Doors, Positive-pressure Tested (GVYI) for the Category G Edge Sealing Systems individual certifications.

Category C Frames — A fire door frame that plays an integral part in the door assembly in complying with the positive-pressure requirements. Three-sided hollow metal frames are generally not required to be positive-pressure tested. See Fire Door and Window Frames (GVTV) for a listing of those manufacturers that can provide steel frames.

Category D Door/Frame Assemblies — A door and frame assembly that is labeled as assembly. Category D door and frame assemblies are Listed under Special-purpose Fire Doors (GSXZ).

Category F Light Kits — Light kits that have been investigated for positive pressure. See Fire Door Glass Light Frames (GVVX) for the Listings of the positive-pressure glass light frames investigated to positive pressure.

Category G Edge Sealing Systems — Edge seals that are surface applied to frames or doors. These seals may or may not have an effect on meeting the leakage requirements for the smoke ("S") rating. See Gasketing and Edge-sealing Materials for Fire Doors, Positive-pressure Tested (GVYI) for the Category G Edge Sealing Systems individual certifications.

Category H Smoke and Draft Control Gasketing — See Gasketing and Edge-sealing Materials for Fire Doors, Positive-pressure Tested (GVYI) for the Category H Smoke and Draft Control Gasketing for the individual certifications.

Category J Gaskets — Gasketing materials that are added to a door assembly for purposes other than Category G Edge Seals and Category H Smoke and Draft Control Gaskets. They are used for purposes such as weather stripping and for sound control. They meet the requirements for positive-pressure tests and can be used on these assemblies. These gasket materials do not contribute to the doors meeting the positive-pressure fire test. They are only investigated so that they do not contribute to flaming when tested to the positive-pressure-test requirements.

RELATED PRODUCTS

For information on fire doors, fire windows, and related frames, hardware, glazing and other individual components, see Fire Door Assemblies and Window Assemblies (GSNN).

For the protection of paper records against loss by fire, see Vault Doors, Class 350, Insulated (RZNR) and File Room Doors, Class 350, Insulated (RWWR).

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FIRE ALARM CABLE (HNGV)

Fire Alarm cable is intended for use in accordance with Article 760 of the National Electrical Code.

NONPOWER-LIMITED FIRE ALARM CABLE (HNHT)

USE AND INSTALLATION

This category covers nonpower-limited fire alarm cable for use in nonpower-limited circuits in accordance with Article 760 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Unless a higher temperature rating is marked on the cable, nonpower-limited fire alarm cable is intended for use where the operating temperature does not exceed 60°C. The marked voltage rating is 150 V.

Nonpower-limited Fire Alarm Cable (HNHT)—Continued

PRODUCT MARKINGS

Nonpower-limited fire alarm cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

NPLF — Indicates cable intended for use within buildings in accordance with Section 760.53(B)(4) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in ANSI/UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

NPLFR — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 760.53(B)(3) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per ANSI/UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

NPLFP — Indicates cable intended for use within buildings in other spaces used for environmental air in accordance with Section 760.53(B)(2) of the NEC. This cable exhibits a maximum peak optical density of 0.50, a maximum average optical density of 0.15, and a maximum flame spread distance of 5.0 ft when tested per ANSI/NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

Cable that complies with the requirements for "Limited Combustible" specified in ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

Cable marked "-30C," "-40C," "-50C," "-60C" or "-70C" complies with a cold bend test conducted at that temperature.

Cable marked "wet" or "wet location" is suitable for use in wet locations.

Cable marked "direct burial," "for direct burial" or "dir bur" is suitable for direct burial in the earth.

Cable marked "CI (max voltage ____)" is suitable for use as circuit-integrity cable at the maximum voltage to ground indicated, in accordance with Section 760.176(F) of the NEC.

Cable marked "CI (max voltage ____)" is intended for use in free air only.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1425, "Cables for Non-Power-Limited Fire-Alarm Circuits."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonpower-limited Fire Alarm Cable."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

POWER-LIMITED FIRE ALARM CABLE
(HNIR)

USE AND INSTALLATION

This category covers power-limited fire alarm cable intended for use in power-limited circuits in accordance with Article 760 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Unless a higher temperature rating is marked on the cable, power-limited fire alarm cable is intended for use where operating temperature does not exceed 60°C. The voltage rating is 300 V but is not marked.

PRODUCT MARKINGS

Power-limited fire alarm cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

FPL — Indicates cable intended for use within buildings in accordance with Section 760.154(C) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in ANSI/UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

FPLP — Indicates cable intended for use within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 760.154(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame

Power-limited Fire Alarm Cable (HNIR)—Continued

spread distance of 5 ft when tested per ANSI/NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

FPLR — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 760.154(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per ANSI/UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

Power-limited Fire Alarm Cable — Indicates cable suitable for use within buildings (1) where the cable is enclosed in a raceway, or (2) in nonconcealed spaces where the exposed length of cable does not exceed 10 ft, in accordance with Sections 760.154(C)(2) and (3) of the NEC. This cable complies with the VW-1 Flame Test requirements in ANSI/UL 1581.

Certified Type FPLP cable that is additionally marked "Also Certified NYC CERT Fire Alarm Cable" has been investigated in accordance with the requirements of the Fire Alarm Code of the Department of Buildings of the City of New York.

Cable that complies with the requirements for "Limited Combustible" specified in ANSI/NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Cable marked "direct burial," "for direct burial" or "dir bur" has been investigated and found suitable for direct burial in the earth.

Cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

Cable marked "CI (max voltage ____)" is suitable for use as circuit-integrity cable at the maximum voltage to ground indicated, in accordance with Section 760.179(G) of the NEC.

Cable marked "CI (max voltage ____)" is intended for use in free air only.

Cable marked "wet" or "wet location" is suitable for use in wet locations.

Cable marked "-30C," "-40C," "-50C," "-60C" or "-70C" complies with a cold bend test conducted at that temperature.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1424, "Cables for Power-Limited Fire-Alarm Circuits."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power-limited Fire Alarm Cable."

In addition, the Listing Mark for cable also Classified for use in accordance with the requirements of the Fire Alarm Code of the Department of Buildings of the City of New York includes the statement "Also Classified for Use as Fire Alarm Cable in New York City."

The Listing Mark for this category requires the use of a holographic label.

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LUMINAIRES AND FITTINGS (HYXT)

USE

This category covers complete luminaires intended for general and special-purpose illumination, and component fittings and retrofits intended for field assembly to or into complete units.

SPECIAL-USE LUMINAIRES

Cooking Hood Luminaires — Luminaires intended for use in nonresidential occupancies in exhaust ducts or hoods above cooking equipment are marked "SUITABLE FOR USE WITHIN COMMERCIAL COOKING HOODS" and "MOUNT A MINIMUM OF 1.2 M (4 FT) ABOVE COOKING SURFACE." Such luminaires are for installation in accordance with ANSI/NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," and Section 410.10(C) of ANSI/NFPA 70, "National Electrical Code" (NEC).

Recessed cooking hood luminaires are additionally marked with a minimum spacing marking: "INSTALL WITH MINIMUM SPACINGS BETWEEN A) CENTER-TO-CENTER OF ADJACENT LUMINAIRES: ____ INCHES; B) TOP OF LUMINAIRE AND AN OVERHEAD BUILDING MEMBER: ____ INCHES; AND C) LUMINAIRE CENTER TO SIDE BUILDING MEMBER: ____ INCHES." The recessed cooking hood is intended to be installed in a hood that maintains these minimum spacings.

Air-handling Luminaires — Luminaires suitable for air handling use are marked "SUITABLE FOR AIR HANDLING USE." For information on the

use of air-handling luminaires in fire-rated ceiling constructions, reference should be made to the design information section under Fire Resistance Ratings (BXUV). For applicable requirements covering air-handling installations, reference should be made to ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems."

Some recessed air-handling luminaires are restricted to certain applications because of certain features and are marked as follows: "VENTILATING OR COOLING AIR ONLY," "ONLY FOR USE IN CEILING PLENUM OF NONCOMBUSTIBLE CONSTRUCTION OR WITH AIR HANDLING PARTS THAT COVER VENT OPENINGS" or "INSTALL ONLY IN ENVIRONMENTAL AIR HANDLING SPACES WHERE A COMPLETE METAL ENCLOSED WIRING SYSTEM IS PROVIDED."

LUMINAIRE INSTALLATION MARKINGS

Unless otherwise indicated under the category for a specific type of luminaire, all luminaires are marked indicating the location where they can be used:

Luminaires marked "DRY LOCATIONS ONLY" are intended to be installed in indoor dry locations.

Luminaires marked "SUITABLE FOR DAMP LOCATIONS" are intended to be installed in damp or dry locations.

Luminaires marked "SUITABLE FOR WET LOCATIONS" are intended to be installed in wet, damp or dry locations.

The locations are defined in Electrical Equipment for Use in Ordinary Locations (AALZ) and the NEC.

In addition to the dry-, damp- or wet-location markings, a luminaire may be optionally investigated and marked for ingress protection in accordance with IEC 60529, "Degrees of Protection Provided by Enclosures (IP Code)." IP code markings are supplemental and not intended to replace dry-, damp- or wet-location markings.

Luminaires investigated for or restricted to a particular mounting location for suitability to wet locations are additionally marked "SUITABLE FOR MOUNTING WITHIN 1.2 M (4 FT) OF THE GROUND," "SUITABLE FOR GROUND-MOUNTED RECESSED," "LIMIT RANGE OF ADJUSTMENT TO (instruction)" or "COVERED CEILING MOUNT ONLY."

Luminaires investigated for or restricted to a particular mounting location are marked "WALL MOUNT ONLY," "FOR CEILING MOUNTING ONLY" or "MOUNTING ORIENTATION" (such as "This End Up").

Luminaires are marked with a supply wire temperature rating "MIN C SUPPLY CONDUCTORS," if intended for greater than 60°C supply wiring. Luminaires rated for over 90°C supply wiring are additionally marked "NOT FOR USE IN DWELLING."

Luminaires that include an integral raceway intended to comply with Exception No. 1 of Section 410.31 of the NEC are marked "SUITABLE FOR USE AS RACEWAY," and are additionally marked to include the maximum number, size and type of conductors they are intended to accommodate. See Surface Metal Raceways (RJBT) for raceways that can be assembled and installed as lighting units.

Some luminaires are only suitable for use with specific lamp types and are so marked. However, luminaires are not investigated or intended for use with sun lamps.

Luminaires containing components that require the luminaire to be connected only to an alternating-current circuit are marked "60 Hz" or "AC ONLY."

Luminaires designed for connection to a proprietary wiring system will specify the name and part number of the proprietary system and all cautionary or other markings required for the system. These systems are covered under Manufactured Wiring Systems (QQVX).

Luminaires designed for connection to other than nominal 120 V supply and/or a 2-wire branch circuit are marked to identify the voltage supply or type of branch circuit or both.

RELATED PRODUCTS

Fire-resistant Luminaires — Luminaires intended for recessed installation in ceilings that have been shown to provide a degree of fire resistance with the floor or roof assembly with which they have been tested are covered under Luminaires, Luminaire Assemblies and Luminaire Enclosures Classified for Fire Resistance (CDHW).

Emergency Lighting — Luminaires intended for simultaneous connection to normal and emergency power circuits, as well as luminaires with integral batteries for emergency illumination, are covered under Emergency Lighting and Power Equipment (FTBR).

Exit Lighting — Luminaires that illuminate an integral legend "Exit" and are intended for installation in accordance with the NEC and ANSI/NFPA 101, "Life Safety Code," are covered under Exit Fixtures (FWBO).

Electric Signs — Products that illuminate an integral legend other than "Exit" are covered under Signs (UXYI).

Suntan Lamps — Lighting products that employ suntan lamps are covered under Sun and Heat Lamps (QPDY) or Personal Sun and Heat Equipment (QGRX).

Submersible Luminaires — Luminaires intended for installation under water in accordance with Article 680 of the NEC are covered under Submersible Luminaires (IFEV) if intended for decorative fountains and simi-

lar locations, or Luminaires and Forming Shells (WBDT) if intended for installation in swimming pools and similar locations.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUMINAIRES AND FITTINGS, SPECIAL PURPOSE, MISCELLANEOUS (IETR)

GENERAL

This category covers special-purpose luminaires and fittings that are parts and/or subassemblies of special-purpose luminaires intended for final assembly into special-purpose luminaires in the field.

PRODUCT MARKINGS

All luminaires and fittings are marked indicating the location where they can be used:

Luminaires and fittings marked "DRY LOCATIONS ONLY" are intended to be installed in indoor, dry locations.

Luminaires and fittings marked "SUITABLE FOR DAMP LOCATIONS" are intended to be installed in damp or dry locations.

Luminaires and fittings marked "SUITABLE FOR WET LOCATIONS" are intended to be installed in wet, damp or dry locations.

All luminaires and fittings bear a model, catalog or series number (or similar designation) adjacent to the Certification Mark.

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1598, "Luminaires."

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Miscellaneous Luminaire," "Floodlight" or "Inspection Light," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUMINAIRE CONVERSIONS, RETROFIT (IEUQ)

GENERAL

This category covers retrofit devices or kits consisting of parts and/or subassemblies intended for field installation in UL-certified luminaires, office furnishing luminaires or portable luminaires. These products have been investigated to determine that, when used in accordance with the manufacturer's instructions, they do not adversely affect the operation of the complete unit.

This category includes reflector kit retrofits and other retrofit devices. Reflector kits are intended to be used to add or replace reflectors in fluorescent luminaires and may also involve relocation, removal or replacement of wiring, lampholders and ballasts. Reflector kits are not intended to be installed on luminaires used as air-handling registers unless the accompanying reflector kit installation instructions specify this combination as suitable.

This category also includes retrofit kits consisting of light-emitting-diode (LED) light sources intended to replace a fluorescent lamp and where it is necessary to modify the luminaire. The modification may involve removing the fluorescent lamp ballast or rewiring lampholders within the luminaire in order to power the LED light source. A luminaire that is modified so it can no longer accept the original lamp has a label affixed (provided by the retrofit kit manufacturer) indicating the luminaire has been modified and can no longer operate the originally intended lamp(s).

RELATED PRODUCTS

Retrofit devices used to convert incandescent exit luminaires to fluorescent exit luminaires are covered under Exit Sign Conversion Kits (FWCF).

LED light sources intended to replace fluorescent lamps and where it is not necessary to modify the luminaire are covered under Lamps, Self-ballasted, Light-emitting-diode Type (OOLV).

Luminaire Conversions, Retrofit (IEUQ)—Continued

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1598, "Luminaires," ANSI/UL 1598B, "Supplemental Requirements for Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires," and ANSI/UL 153, "Portable Electric Luminaires."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

For reflector kits:

**LUMINAIRE CONVERSION, RETROFIT
FOR USE ONLY WITH + IDENTIFIED IN MANUFACTURER'S
INSTRUCTIONS
Control No.**

For nonreflector kits:

The Classification Mark for retrofit devices that are other than reflector kits includes the Classification Mark elements detailed above and the following additional information:

**LUMINAIRE CONVERSION, RETROFIT
(WITH RESPECT ONLY TO *)
FOR USE ONLY WITH +
Control No.**

+ **FLUORESCENT LUMINAIRES, INCANDESCENT LUMINAIRES,
HID LUMINAIRES, OFFICE FURNISHING LUMINAIRES or PORTABLE
LUMINAIRES**

* **RISK OF FIRE or RISK OF SHOCK** (the entire parenthetical phrase is provided only if found applicable by UL)

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUMINAIRE POLES (IEUR)

USE

This category covers poles intended for the support of luminaires in accordance with Article 410 of ANSI/NFPA 70, "National Electrical Code." Included are poles that exceed 12 feet in length, measured from the bottom of the base, or from the intended grade level of poles for installation partially in ground. The poles are investigated with respect to suitability of the enclosure for supply conductors, provision of equipment grounding and bonding means, and a means of access to wiring.

These poles have not been investigated for mechanical strength or wind loading.

These poles have been investigated for use in wet locations.

PRODUCT MARKINGS

Poles greater than 100 feet in length and not provided with conductor support are marked "FOR USE ONLY WITH A LUMINAIRE WITH INTEGRAL CONDUCTOR SUPPORT."

RELATED PRODUCTS

Poles not exceeding 12 feet in length are covered under Luminaire Fittings (IFFX).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1598, "Luminaires."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**LUMINAIRE POLE
WITH RESPECT TO ELECTRICAL HAZARDS ONLY
Control No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FLUORESCENT-LAMP-TYPE LUMINAIRES
(IEUT)

This category covers surface and recessed luminaires containing only fluorescent lamps or fluorescent and incandescent lamps. Luminaires that contain HID lamps in combination with fluorescent lamps are Listed under HID Lamp Type Luminaires (IEWX).

All luminaires employ a Class P thermally protected ballast except that luminaires intended for use with straight tubular lamps and/or marked for "OUTDOOR USE ONLY" incorporate a Class P thermally protected or a non-Class P ballast of the simple reactance type.

For additional information see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

SPECIAL USE LUMINAIRES

Luminaires intended for connection only to a 24 V or less input and for use in recreational vehicles are covered under Low Voltage Luminaires for Recreational Vehicle Use (IFDQ).

Luminaires intended for use with germicidal lamps (germicidal lamps should not be used in ordinary luminaires) are marked "THIS LUMINAIRE IS DESIGNED FOR USE WITH GERMICIDAL LAMPS AND MUST BE INSTALLED IN COMPLIANCE WITH COMPETENT TECHNICAL DIRECTIONS SO THAT THE USER'S EYE AND BARE SKIN WILL NOT BE SUBJECTED TO INJURIOUS RAYS."

LUMINAIRE INSTALLATION MARKINGS

All luminaires except those intended for use with a remote ballast are marked with their electrical ratings excluding any convenience receptacle provided, stating the voltage, current or volt-amperes and frequency.

As an alternative to a marked volt-ampere rating, the luminaire line volt-amperes can be determined by the following markings: "FOR LINE VOLT-AMPERES MULTIPLY TOTAL LAMP WATTAGE BY 1.5" for luminaires with high power factor preheat or rapid start ballasts; "FOR LINE VOLT-AMPERES MULTIPLY TOTAL LAMP WATTAGE BY 2.5" for luminaires with low power factor preheat or rapid start ballasts; or "FOR LINE VOLT-AMPERES MULTIPLY ALL LAMPS IN INCHES BY ____" for luminaires with instant start ballasts and where the blank corresponds to a multiplying factor based on supply voltage.

Luminaires with a ballast output circuit voltage exceeding 1000 V are marked "NOT FOR USE IN DWELLING."

Luminaires intended to be field connected to a remote ballast are marked "USE BALLAST FOR ____ WATT ____ TYPE LAMP" and "USE THERMALLY PROTECTED BALLAST FOR TYPE LAMPS."

Luminaires are suitable for use with 60C field wiring unless (1) the field wiring is routed within 3 inches of the ballast, in which case 90C rated wire is to be used, or (2) the luminaire is marked with a supply wire rating.

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Fluorescent Surface-mounted Luminaires (IEUZ)

GENERAL

This category covers surface-mounted luminaires, including floor-, wall-, ceiling-, and pole-mounted luminaires. Ceiling-mounted luminaires include cord-, stem-, chain- and cable-suspended luminaires, in addition to outlet box-mounted luminaires.

LUMINAIRE INSTALLATION MARKINGS

All ceiling- and wall-mounted luminaires are acceptable for mounting on an insulated ceiling or wall. Exceptions: (1) luminaires obviously not designed for ceiling use or if marked "WALL MOUNT ONLY" are not acceptable for mounting on ceilings, and (2) luminaires marked "NON-COMBUSTIBLE SURFACE ONLY."

All luminaires provided with a power-supply cord are intended for chain, hook, or similar suspension means only and are marked "FOR CHAIN OR HOOK SUSPENSION ONLY."

Luminaires intended for undercabinet mounting are marked "SUITABLE FOR UNDER-CABINET MOUNT."

Luminaires intended for continuous-row mounting are marked "SUITABLE FOR CONTINUOUS ROW MOUNTING."

Luminaires weighing more than 50 lbs and intended for outlet box connection are marked "THIS LUMINAIRE MUST BE MOUNTED OR SUPPORTED INDEPENDENTLY OF AN OUTLET BOX."

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

PRODUCT MARKINGS

All luminaires bear a model, catalog or series number (or similar designation) or the words "Fluorescent," "Wired Fluorescent Channel" or "Wired Fluorescent Reflector" adjacent to the Certification Mark.

ADDITIONAL INFORMATION

For additional information, see Fluorescent Lamp-type Luminaires (IEUT), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

Fluorescent Surface-mounted Luminaires (IEUZ)—Continued

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1598, "Luminaires."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Luminaire."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Fluorescent Recessed Luminaires (IEVV)

GENERAL

This category covers luminaires intended for installation in recessed cavities in walls, ceilings and similar locations in accordance with Article 410, Parts XI and XII of ANSI/NFPA 70, "National Electrical Code" (NEC).

TYPES OF RECESSED LUMINAIRES

TYPE IC LUMINAIRE — Luminaires marked "TYPE IC" may be installed such that insulation and other combustible materials are in contact with, and over the top of, the luminaire.

TYPE NON-IC LUMINAIRE — Recessed luminaires, except those identified as Type IC or for use in concrete only, are intended to be installed in an uninsulated or insulated ceiling (or wall), with all insulation kept a minimum distance of 3 in. from the sides of the luminaire and not placed over the luminaire such that it would entrap the heat produced by the luminaire. Other combustible materials are spaced, except at the points of support, at least 1/2 in. from the luminaire.

For proper heat dissipation, Type Non-IC luminaires are intended to be installed in a cavity not closer than 1/2 in. from any surface forming the cavity behind the recessed portion of the luminaire and not closer than 1 in. from adjacent luminaires.

CONCRETE-ONLY LUMINAIRE — A recessed luminaire exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked "FOR USE IN CONCRETE ONLY."

A Type IC or non-IC luminaire that is sealed to prevent the entry of concrete may be installed in concrete providing it is marked "SUITABLE FOR USE IN Poured CONCRETE."

SUSPENDED-CEILING LUMINAIRE — All recessed luminaires, except those marked for use in concrete only, are suitable for use in suspended ceilings and may be marked "SUITABLE FOR SUSPENDED CEILING."

Recessed luminaires intended for use in suspended ceilings and provided with integral clips are marked for use with particular grid systems. When installed in accordance with this marking they comply with 410.36(B) of the NEC. Instructions for using clips to secure the luminaire to the grid are provided with the luminaire. The ability of these clips to withstand seismic disturbances has not been investigated.

GROUND-MOUNTED RECESSED LUMINAIRE — A ground-mounted recessed luminaire exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked "SUITABLE FOR GROUND-MOUNTED RECESSED ONLY."

A ground-mounted recessed luminaire suitable for installation in non-fire-resistant mediums such as a wooden deck is marked "SUITABLE FOR GROUND-MOUNTED RECESSED."

LUMINAIRE INSTALLATION MARKINGS

A luminaire with an integral junction box or wiring compartment and investigated for any heat contribution added by branch-circuit conductors is marked "MAXIMUM OF ___ NO. ___ AWG BRANCH CIRCUIT CONDUCTORS SUITABLE ___ C PERMITTED IN BOX." A luminaire suitable for branch-circuit conductors, but not for pulling wires through conduit, is additionally marked "FOR CABLE USE ONLY - NOT FOR PULLING WIRES."

Luminaires which, by their construction, do not permit access to or inspection of field-wiring connections from the front of the luminaire, after installation, are marked "ACCESS ABOVE CEILING REQUIRED," "ACCESS BEHIND WALL REQUIRED" or "ACCESS NONCOMBUSTIBLE CEILING PLENUM ONLY."

Luminaires provided with polymeric recessed housings are marked "FOR USE IN ONE- AND TWO-FAMILY DWELLINGS ONLY" and "FOR USE IN NON-FIRE RATED INSTALLATIONS ONLY."

Luminaires provided with recessed housings with openings that do not close off the room side to ceiling opening are marked "FOR USE IN NON-FIRE RATED INSTALLATIONS ONLY."

Fluorescent Recessed Luminaires (IEVV)—Continued

Luminaires that consist of 1) a luminaire housing and trims or 2) a rough-in section and finishing sections are marked on each separable part with correlation markings:

1) For luminaire housing and trims, the housing is marked "USE WITH [manufacturer's name] [catalog number] TRIMS" and each trim is marked with the manufacturer's name and catalog number;

2) For rough-in and finishing sections, the rough-in section is marked "ROUGH-IN SECTION FOR USE WITH FINISHING SECTION ___," where the blank refers to the type or catalog number. The finishing section is marked in the same manner stating "FINISHING SECTION FOR USE WITH ROUGH-IN SECTION ___."

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

PRODUCT MARKINGS

All luminaires bear a model, catalog or series number (or similar designation) or the words "Recessed Fluorescent," "Recessed Fluorescent Channel," "Wired Recessed Fluorescent Luminaire Reflector," "Wired Recessed Fluorescent Channel" or "Wired Fluorescent Recessed Section" adjacent to the Listing Mark.

ADDITIONAL INFORMATION

For additional information, see Fluorescent Lamp-type Luminaires (IEUT), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1598, "Luminaires."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Luminaire."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Light Diffusers and Lenses for Air-handling Luminaires, Fluorescent (IEWR)

GENERAL

This category covers light diffusers consisting of metal frames and panels of nonmetallic light-diffusing material, other than glass. They are for use on luminaires that are designed to handle return air in a heating or air-conditioning system. The method of mounting in the metal frame, the frame dimensions and the panel material used are so designed that the panel drops out of the frame under most fire conditions and, if the panel material ignites while in the frame, it will not propagate flame to adjacent light diffusers.

ADDITIONAL INFORMATION

For additional information, see Fluorescent Lamp Type Luminaires (IEUT), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Light Diffuser for Air Handling Luminaires."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HIGH-INTENSITY-DISCHARGE-LAMP-TYPE LUMINAIRES (IEWX)

GENERAL

This category covers surface- and recessed-lighting luminaires containing high-intensity-discharge lamps and may contain fluorescent and incandescent lamps.

LUMINAIRE INSTALLATION MARKINGS

PRODUCT CATEGORIES BY CATEGORY CODE

High-intensity-discharge-lamp-type Luminaires (IEWX)—Continued

All luminaires except those intended for use with a remote ballast are marked with their electrical ratings, excluding any convenience receptacle provided, stating the voltage, current or volt-amperes and frequency.

Luminaires intended to be field connected to a remote ballast are marked "USE BALLAST FOR ___ WATT ___ TYPE LAMP" and "USE THERMALLY PROTECTED BALLAST FOR TYPE LAMPS."

Luminaires intended for use with metal halide lamps and not provided with a suitable lamp containment barrier, are marked "CAUTION — RISK OF FIRE, DO NOT USE A LAMP IDENTIFIED FOR USE IN ENCLOSED LUMINAIRES."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

High-intensity-discharge Surface-mounted Luminaires (IEXT)

GENERAL

This category covers surface-mounted luminaires, including floor-, wall-, ceiling-, and pole-mounted luminaires. Ceiling-mounted luminaires include cord-, stem-, chain- and cable-suspended luminaires, in addition to outlet box-mounted luminaires.

SPECIAL-USE LUMINAIRES

Luminaires suitable for continuous operation in an elevated ambient, such as a boiler room, foundry, etc., are marked "SUITABLE FOR OPERATION IN AMBIENTS NOT EXCEEDING ___ C," where the blank is filled in with the intended elevated ambient.

LUMINAIRE INSTALLATION MARKINGS

All ceiling- and wall-mounted luminaires are acceptable for mounting on an insulated ceiling or wall. Exceptions: (1) luminaires obviously not designed for ceiling use or if marked "WALL MOUNT ONLY" are not acceptable for mounting on ceilings, and (2) luminaires marked "NON-COMBUSTIBLE SURFACE ONLY."

All luminaires provided with a power-supply cord are intended for chain, hook, or similar suspension means only and are marked "FOR CHAIN OR HOOK SUSPENSION ONLY."

Luminaires intended for undercabinet mounting are marked "SUITABLE FOR UNDER-CABINET MOUNT."

Luminaires intended for continuous-row mounting are marked "SUITABLE FOR CONTINUOUS ROW MOUNTING."

Luminaires weighing more than 50 lbs and intended for outlet box connection are marked "THIS LUMINAIRE MUST BE MOUNTED OR SUPPORTED INDEPENDENTLY OF AN OUTLET BOX."

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

PRODUCT MARKINGS

All luminaires bear a model, catalog or series number (or similar designation) or the words "HID" or "Wired HID Section" adjacent to the Certification Mark.

ADDITIONAL INFORMATION

For additional information, see High-intensity-discharge-lamp-type Luminaires (IEWX), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1598, "Luminaires."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Luminaire."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

High-intensity-discharge Recessed Luminaires (IEXZ)

GENERAL

High-intensity-discharge Recessed Luminaires (IEXZ)—Continued

This category covers luminaires intended for installation in recessed cavities in walls, ceilings and similar locations in accordance with Article 410, Parts XI and XII of ANSI/NFPA 70, "National Electrical Code" (NEC).

TYPES OF RECESSED LUMINAIRES

TYPE IC LUMINAIRE — Luminaires marked "TYPE IC" may be installed such that insulation and other combustible materials are in contact with, and over the top of, the luminaire.

TYPE NON-IC LUMINAIRE — Recessed luminaires, except those identified as Type IC or for use in concrete only, are intended to be installed in an uninsulated or insulated ceiling (or wall), with all insulation kept a minimum distance of 3 in. from the sides of the luminaire and not placed over the luminaire such that it would entrap the heat produced by the luminaire. Other combustible materials are spaced, except at the points of support, at least 1/2 in. from the luminaire.

Type Non-IC luminaires are provided with thermal protection to deactivate the lamp(s) should insulation be placed over or in contact with the luminaire.

For proper heat dissipation, Type Non-IC luminaires are intended to be installed in a cavity as follows: If not marked with any spacing information, the luminaire is intended to be installed not closer than 1/2 in. from any surface forming the cavity behind the recessed portion of the luminaire and not closer than 1 in. from adjacent luminaires.

Luminaires intended for marked-spacing installation are marked "INSTALL WITH MINIMUM SPACINGS BETWEEN A) CENTER-TO-CENTER OF ADJACENT LUMINAIRES: ___ INCHES; B) TOP OF LUMINAIRE AND AN OVERHEAD BUILDING MEMBER: ___ INCHES; AND C) LUMINAIRE CENTER TO SIDE BUILDING MEMBER: ___ INCHES." The marked-spacing luminaire is intended to be installed in a cavity that maintains these minimum spacings.

Individual obstructions, such as ceiling joists, barriers to maintain thermal insulation 3 in. from the luminaire, and other structural support members may be in the cavity area above the luminaire, provided (1) they are not closer than 1/2 in. from any part of the luminaire (except for points used in support of the luminaire), and (2) they do not seal off the luminaire from the remaining portion of the cavity. More than one marked-spacing luminaire may be installed in the same cavity, provided the marked spacings are maintained from each luminaire to cavity sidewalls and to adjacent luminaires. Spacings between adjacent luminaires are measured center to center, based upon the geometric center of the luminaire at the ceiling line.

CONCRETE-ONLY LUMINAIRE — A recessed luminaire exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked "FOR USE IN CONCRETE ONLY."

A Type IC or non-IC luminaire that is sealed to prevent the entry of concrete may be installed in concrete providing it is marked "SUITABLE FOR USE IN POURED CONCRETE."

SUSPENDED-CEILING LUMINAIRE — All recessed luminaires, except those marked for use in concrete only, are suitable for use in suspended ceilings and may be marked "SUITABLE FOR SUSPENDED CEILING."

Recessed luminaires intended for use in suspended ceilings and provided with integral clips are marked for use with particular grid systems. When installed in accordance with this marking they comply with 410.16(C) of the NEC. Instructions for using clips to secure the luminaire to the grid are provided with the luminaire. The ability of these clips to withstand seismic disturbances has not been investigated.

GROUND-MOUNTED RECESSED LUMINAIRE — A ground-mounted recessed luminaire exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked "SUITABLE FOR GROUND-MOUNTED RECESSED ONLY."

A ground-mounted recessed luminaire that is suitable for installation in non-fire-resistant mediums, such as a wooden deck, is marked "SUITABLE FOR GROUND-MOUNTED RECESSED."

LUMINAIRE INSTALLATION INSTRUCTIONS

All recessed luminaires, except those marked "FOR USE IN POURED CONCRETE ONLY," are marked "BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING."

Luminaires that produce temperatures in excess of 90°C at points of mounting to the building structure are marked "INSTALL IN BUILDINGS OF FIRE-RESISTIVE CONSTRUCTION — MOUNT ON NONCOMBUSTIBLE MATERIAL."

Only those luminaires with an integral junction box or wiring compartment marked "MAXIMUM OF NO. ___ AWG BRANCH CIRCUIT CONDUCTOR SUITABLE FOR ___ C PERMITTED IN BOX," have been investigated for any heat contribution added by branch-circuit conductors.

Luminaires which, by their construction, do not permit access to or inspection of field-wiring connections from the front of the luminaire, after installation, are marked "ACCESS ABOVE CEILING REQUIRED" or "ACCESS BEHIND WALL REQUIRED."

Luminaires provided with polymeric recessed housings are marked "FOR USE IN ONE- AND TWO-FAMILY DWELLINGS ONLY" and "FOR USE IN NON-FIRE RATED INSTALLATIONS."

High-intensity-discharge Recessed Luminaires (IEZX)—Continued

Luminaires that consist of (1) a luminaire housing and trims or (2) a rough-in section and finishing sections are marked on each separable part with correlation markings:

- (1) For luminaire housing and trims, the housing is marked "USE WITH [manufacturer's name] [catalog number] TRIMS" and each trim is marked with the manufacturer's name and catalog number;
- (2) For rough-in and finishing sections, the rough-in section is marked "ROUGH-IN SECTION FOR USE WITH FINISHING SECTION," where the blank spaces are filled in with a) type or catalog number or b) refers to the type or catalog number located elsewhere on the label. The finishing section is marked in the same manner stating "FINISHING SECTION FOR USE WITH ROUGH-IN SECTION."

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

PRODUCT MARKINGS

All luminaires bear a model, catalog or series number (or similar designation) or the words "Recessed HID," "Recessed HID Type IC," "Rough-In Section for Recessed HID," "Rough-In Section for Recessed HID Type IC," "Finishing Section for Recessed HID" or "Wired Recessed HID Section" adjacent to the Certification Mark.

ADDITIONAL INFORMATION

For additional information, see High Intensity Discharge Lamp-type Luminaires (IEWX) Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1598, "Luminaires."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Luminaire."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

INCANDESCENT-LAMP-TYPE LUMINAIRES (IEYV)

GENERAL

This category covers surface and recessed lighting luminaires containing only incandescent lamps.

Luminaires provided with electrical loads other than lampholders directly connected to a 120 V, 2-wire branch circuit supply are marked with the total current rating for the luminaire, excluding any convenience receptacle provided.

Luminaires provided with medium- or mogul-base lampholders are investigated for use with Types A or PS lamps unless marked otherwise. Also, some luminaires are only suitable for use with specific lamp types and are so marked.

A luminaire intended for use with a tungsten-halogen lamp and that does not require an additional lamp containment barrier is marked "USE LAMP MARKED 'SUITABLE FOR USE IN OPEN LUMINAIRES'."

Luminaires are not intended for use with infrared or grow lamps unless so marked.

RELATED PRODUCTS

Luminaires that contain fluorescent or high-intensity-discharge lamps in combination with incandescent lamps are covered under Fluorescent-lamp-type Luminaires (IEUT) and High-intensity-discharge-lamp-type Luminaires (IEWX), respectively.

Luminaires intended for connection only to a 24 V or less input and for use in recreational vehicles are covered under Low-voltage Luminaires for Recreational Vehicle Use (IFDQ).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Incandescent Surface-mounted Luminaires (IEZR)

GENERAL

This category covers surface-mounted luminaires, including floor-, wall-, ceiling-, and pole-mounted luminaires.

Ceiling-mounted luminaires include cord-, stem-, chain- and cable-suspended luminaires, in addition to outlet box-mounted luminaires.

SPECIAL-USE LUMINAIRES

Luminaires suitable for continuous operation in an elevated ambient, such as a boiler room, foundry, etc., are marked "SUITABLE FOR OPERATION IN AMBIENTS NOT EXCEEDING __ C," where the blank is filled in with intended elevated ambient.

LUMINAIRE INSTALLATION MARKINGS

If the required rating of the field wiring supplying the luminaire requires the installer to push the supply conductors from the luminaire into the outlet box, the luminaire is marked "PUSH CONDUCTORS INTO JUNCTION BOX."

All ceiling- and wall-mounted luminaires are acceptable for mounting on an insulated ceiling or wall. Exceptions: (1) luminaires obviously not designed for ceiling use or if marked "WALL MOUNT ONLY" are not acceptable for mounting on ceilings, and (2) luminaires marked "NON-COMBUSTIBLE SURFACE ONLY."

Luminaires intended for undercabinet mounting are marked "SUITABLE FOR UNDER-CABINET MOUNT."

Luminaires intended for continuous-row mounting are marked "SUITABLE FOR CONTINUOUS ROW MOUNTING."

Luminaires weighing more than 50 lbs and intended for outlet box connection are marked "THIS LUMINAIRE MUST BE MOUNTED OR SUPPORTED INDEPENDENTLY OF AN OUTLET BOX."

PRODUCT MARKINGS

All luminaires bear a model, catalog or series number (or similar designation) or the word "Incandescent" adjacent to the Certification Mark.

ADDITIONAL INFORMATION

For additional information, see Incandescent-lamp-type Luminaires (IEYV), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1598, "Luminaires."

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Luminaire."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Incandescent Recessed Luminaires (IEZX)

GENERAL

This category covers luminaires intended for installation in recessed cavities in walls, ceilings and similar locations in accordance with Article 410, Parts XI and XII of ANSI/NFPA 70, "National Electrical Code" (NEC).

SPECIAL-USE LUMINAIRES

Recessed-type luminaires suitable for optional use with infrared heating lamps are marked and rated for 250 W reflector-type lamps. Recessed units suitable only for use with one or more infrared heating lamps are covered under Air Heaters, Room, Fixed and Location-dedicated (KKWS).

TYPES OF RECESSED LUMINAIRES

TYPE IC LUMINAIRE — Luminaires marked "TYPE IC" may be installed such that insulation and other combustible materials are in contact with, and over the top of, the luminaire. Type IC luminaires are provided with thermal protection to deactivate the lamp should the luminaire be mislamped.

INHERENTLY-PROTECTED LUMINAIRE — A recessed luminaire which does not exceed temperatures greater than 90°C on outside surfaces even when covered with insulation and mislamped or overlapped is identified by being marked "INHERENTLY PROTECTED."

TYPE NON-IC LUMINAIRE — Recessed luminaires, except those identified as Type IC or for use in concrete only, are intended to be installed in an uninsulated or insulated ceiling (or wall), with all insulation kept a minimum distance of 3 in. from the sides of the luminaire and not placed

Incandescent Recessed Luminaires (IEZX)—Continued

over the luminaire such that it would entrap the heat produced by the luminaire. Other combustible materials are spaced, except at the points of support, at least 1/2 in. from the luminaire.

Type Non-IC luminaires are provided with thermal protection to deactivate the lamp(s) should insulation be placed over or in contact with the luminaire.

For proper heat dissipation, Type Non-IC luminaires are intended to be installed in a cavity as follows: If not marked with any spacing information, the luminaire is intended to be installed not closer than 1/2 in. from any surface forming the cavity behind the recessed portion of the luminaire and not closer than 1 in. from adjacent luminaires.

Luminaires intended for marked-spacing installation are marked "INSTALL WITH MINIMUM SPACINGS BETWEEN A) CENTER-TO-CENTER OF ADJACENT LUMINAIRES: ___ INCHES; B) TOP OF LUMINAIRE AND AN OVERHEAD BUILDING MEMBER: ___ INCHES; AND C) LUMINAIRE CENTER TO SIDE BUILDING MEMBER: ___ INCHES." The marked-spacing luminaire is intended to be installed in a cavity that maintains these minimum spacings.

Individual obstructions, such as ceiling joists, barriers to maintain thermal insulation 3 in. from the luminaire and other structural support members may be in the cavity area above the luminaire provided (1) they are not closer than 1/2 in. from any part of the luminaire (except for points used in support of the luminaire), and (2) they do not seal off the luminaire from the remaining portion of the cavity. More than one marked-spacing luminaire may be installed in the same cavity, provided the marked spacings are maintained from each luminaire to cavity sidewalls and to adjacent luminaires. Spacings between adjacent luminaires are measured center to center, based upon the geometric center of the luminaire at the ceiling line.

CONCRETE-ONLY LUMINAIRE — A recessed luminaire exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked "FOR USE IN CONCRETE ONLY."

A Type IC or Non-IC luminaire sealed to prevent the entry of concrete may be installed in concrete providing it is marked "SUITABLE FOR USE IN POURED CONCRETE."

SUSPENDED-CEILING LUMINAIRE — All recessed luminaires except those marked for use in concrete only are suitable for use in suspended ceilings and may be marked "SUITABLE FOR SUSPENDED CEILING."

Recessed luminaires intended for use in suspended ceilings and provided with integral clips are marked for use with particular grid systems. When installed in accordance with this marking they comply with 410-16(c) of the NEC. Instructions for using clips to secure the luminaire to the grid are provided with the luminaire. The ability of these clips to withstand seismic disturbances has not been investigated.

GROUND-MOUNTED RECESSED LUMINAIRE — A ground-mounted recessed luminaire exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked "SUITABLE FOR GROUND-MOUNTED RECESSED ONLY."

A ground-mounted recessed luminaire suitable for installation in non-fire-resistant mediums, such as a wooden deck, is marked "SUITABLE FOR GROUND-MOUNTED RECESSED."

LUMINAIRE INSTALLATION MARKINGS

All recessed luminaires, except those marked "FOR USE IN POURED CONCRETE ONLY," are marked "BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING."

Luminaires that produce temperatures in excess of 90°C at points of mounting to the building structure are marked "INSTALL IN BUILDINGS OF FIRE RESISTANT CONSTRUCTION."

Only those luminaires with an integral junction box or wiring compartment marked "MAXIMUM OF NO. ___ AWG BRANCH CIRCUIT CONDUCTOR SUITABLE FOR ___ C PERMITTED IN BOX," have been investigated for any heat contribution added by branch circuit conductors.

Luminaires which, by their construction, do not permit access to or inspection of field wiring connections from the front of the luminaire, after installation, are marked "ACCESS ABOVE CEILING REQUIRED" or "ACCESS BEHIND WALL REQUIRED."

Luminaires that are provided with polymeric recessed housings are marked "FOR USE IN ONE- AND TWO-FAMILY DWELLINGS ONLY" and "FOR USE IN NON-FIRE RATED INSTALLATIONS."

Luminaires that consist of (1) a luminaire housing and trims or (2) a rough-in section and finishing sections are marked on each separable part with correlation markings:

- (1) For luminaire housing and trims, the housing is marked "USE WITH [manufacturer's name] [catalog number] TRIMS" and each trim is marked with the manufacturer's name and catalog number.
- (2) For rough-in and finishing sections, the rough-in section is marked "ROUGH-IN SECTION FOR USE WITH FINISHING SECTION," where the blank spaces are filled in with a) type or catalog number or b) refers to the type or catalog number located elsewhere on the label. The finishing section is marked in the same manner stating "FINISHING SECTION FOR USE WITH ROUGH-IN SECTION."

Incandescent Recessed Luminaires (IEZX)—Continued

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

PRODUCT MARKINGS

All luminaires bear a model, catalog or series number (or similar designation) or the words "Recessed Incandescent," "Recessed Incandescent Type IC," "Rough-In Section for Recessed Incandescent," "Rough-In Section for Recessed Incandescent Type IC" or "Finishing Section for Recessed Fixture" adjacent to the Certification Mark.

RELATED PRODUCTS

See Incandescent Recessed Luminaires, Convertible, Non-IC/IC (IFAH).

ADDITIONAL INFORMATION

For additional information, see Incandescent-lamp-type Luminaires (IEYV), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1598, "Luminaires."

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Luminaire."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Incandescent Recessed Luminaires, Convertible, Non-IC/IC (IFAH)

GENERAL

This category covers luminaires intended for installation in recessed cavities in walls, ceilings and similar locations in accordance with Article 410, Parts XI and XII of ANSI/NFPA 70, "National Electrical Code."

These products may be installed in either IC or non-IC applications. The same rough-in section or luminaire housing is used for both IC and non-IC applications. The choice of finishing section/trim and light source (lamp) determine whether the completed luminaire is suitable for Type IC installations or non-IC installations.

Details for making the proper choice of finishing section/trim and lamp appropriate for the application are contained in the installation instructions packaged with the rough-in section/luminaire housing. All luminaires employ a thermal protective device to deactivate the lamp(s) in the event increased temperature conditions result where the installation instructions are not followed.

TYPE IC INSTALLATIONS — Refer to Incandescent Recessed Luminaires (IEZX) sections entitled "Type IC Luminaires."

TYPE NON-IC INSTALLATIONS — Refer to Incandescent Recessed Luminaires (IEZX) sections entitled "Type Non-IC Luminaires."

LUMINAIRE INSTALLATION MARKINGS

The rough-in section or the luminaire housing of a convertible recessed luminaire is marked with the following two statements:

- A. "BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING"
- B. "DO NOT INSTALL INSULATION WITHIN 76 MM (3 IN.) OF ANY PART OF THE LUMINAIRE"

The marking in item B is on a peel-off label that is removed when the luminaire is installed in a Type IC installation.

Luminaires that consist of (1) a luminaire housing and trims or (2) a rough-in section and finishing sections are marked on each separable part with correlation markings:

- (1) For luminaire housing and trims, the housing is marked "USE WITH [manufacturer's name] [catalog number] TRIMS," and each trim is marked with the manufacturer's name and catalog number.
- (2) For rough-in and finishing sections, the rough-in section is marked "ROUGH-IN ___ SECTION FOR CONVERTIBLE RECESSED LUMINAIRE" and a correlation marking for the trims "TYPE IC TRIMS/FINISHING SECTIONS: AA, BB, CC, etc." or "TYPE IC/NON-IC TRIMS/FINISHING SECTIONS: AA, BB, CC, etc." The finishing section is marked in the same manner stating "FINISHING SECTION FOR USE WITH ROUGH-IN SECTION ___."

PRODUCT MARKINGS

All luminaires bear a model, catalog or series number (or similar designation) or the words "Recessed Incandescent Convertible Non-IC/

Incandescent Recessed Luminaires, Convertible, Non-IC/IC (IFAH)–Continued

IC,” “Recessed Incandescent Convertible Non-IC/IC Rough-In Section” or “Recessed Incandescent Convertible Non-IC/IC Finishing Section” adjacent to the Certification Mark.

RELATED PRODUCTS

See Incandescent Recessed Luminaires (IEZX).

ADDITIONAL INFORMATION

For additional information, see Incandescent-lamp-type Luminaires (IEYV), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1598, “Luminaires.”

Products employing LED light sources are additionally investigated to ANSI/UL 8750, “Light Emitting Diode (LED) Equipment for Use in Lighting Products.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Luminaire.”

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LIGHT-EMITTING-DIODE LUMINAIRES (IFAK)

GENERAL

This category covers surface- and recessed-lighting luminaires containing only light-emitting-diode (LED) light sources.

Luminaires are not intended for use with infrared or ultraviolet LED light sources unless so marked.

RELATED PRODUCTS

Luminaires that contain incandescent lamps in combination with an LED light source are covered under Incandescent Surface-mounted Luminaires (IEZR), Incandescent Recessed Luminaires (IEZX) and Incandescent Recessed Luminaires, Convertible, Non-IC/IC (IFAH).

Luminaires that contain fluorescent lamps in combination with an LED light source are covered under Fluorescent Surface-mounted Luminaires (IEUZ), Fluorescent Recessed Luminaires (IEVV) and Light Diffusers and Lenses for Air-handling Luminaires, Fluorescent (IEWR).

Luminaires that contain high-intensity discharge lamps in combination with an LED light source are covered under High-intensity-discharge Surface-mounted Luminaires (IEXT) and High-intensity-discharge Recessed Luminaires (IEZX).

Luminaires with an LED light source intended to be connected to a non-integral power source rated 30 V ac (60 V dc) or less are covered under Low-voltage Lighting Systems, Power Units, Luminaires and Fittings (IFDR).

Luminaires with an LED light source connected to a nonintegral power source rated 15 V ac (30 V dc) or less and intended to be part of a low-voltage landscape lighting system are covered under Landscape Lighting Systems, Low Voltage (IFDH).

Luminaires with an LED light source intended for connection only to a 24 V or less input and for use in recreational vehicles are covered under Low-voltage Luminaires for Recreational Vehicle Use (IFDQ).

Light-emitting-diode Surface-mounted Luminaires (IFAM)

GENERAL

This category covers surface-mounted luminaires, including floor-, wall-, ceiling-, undercabinet- and pole-mounted luminaires.

Ceiling-mounted luminaires include cord-, stem-, chain- and cable-suspended luminaires, in addition to outlet-box-mounted luminaires.

SPECIAL-USE LUMINAIRES

Luminaires suitable for continuous operation in an elevated ambient, such as a boiler room, foundry, etc., are marked “SUITABLE FOR OPERATION IN AMBIENT NOT EXCEEDING __ C,” where the blank is filled in with the intended elevated ambient.

LUMINAIRE INSTALLATION MARKINGS

Light-emitting-diode Surface-mounted Luminaires (IFAM)–Continued

If the required rating of the field wiring supplying the luminaire requires the installer to push the supply conductors from the luminaire into the outlet box, the luminaire is marked “PUSH CONDUCTORS INTO JUNCTION BOX.”

All ceiling- and wall-mounted luminaires are acceptable for mounting on an insulated ceiling or wall. Exceptions: (1) luminaires obviously not designed for ceiling use or if marked “WALL MOUNT ONLY” are not acceptable for mounting on ceilings, and (2) luminaires marked “NON-COMBUSTIBLE SURFACE ONLY.”

Luminaires intended for undercabinet mounting are marked “SUITABLE FOR UNDER-CABINET MOUNT.”

Luminaires intended for continuous-row mounting are marked “SUITABLE FOR CONTINUOUS ROW MOUNTING.”

Wall-mounted luminaires weighing more than 11.3 kg (25 lbs) and ceiling-mounted luminaires weighing more than 22.7 kg (50 lbs) intended for outlet box connection are marked “THIS LUMINAIRE MUST BE MOUNTED OR SUPPORTED INDEPENDENTLY OF AN OUTLET BOX.”

PRODUCT MARKINGS

All luminaires bear a model, catalog or series number or similar designation.

RELATED PRODUCTS

Cord-connected undercabinet light-emitting-diode (LED) luminaires with an attachment plug or a direct-plug-in power supply are covered under Light-emitting-diode Luminaires, Portable (QOVZ).

LED cabinet luminaires are covered under Portable Cabinet Light-emitting-diode Luminaires (QOVA).

ADDITIONAL INFORMATION

For additional information, see Light-emitting-diode Luminaires (IFAK), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1598, “Luminaires,” and ANSI/UL 8750, “Light Emitting Diode (LED) Equipment for Use in Lighting Products.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Luminaire.”

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Light-emitting-diode Recessed Luminaires (IFAO)

GENERAL

This category covers luminaires intended for installation in recessed cavities in walls, ceilings and similar locations in accordance with Article 410, Parts XI and XII of ANSI/NFPA 70, “National Electrical Code” (NEC).

RECESSED LUMINAIRE TYPES

Type IC Luminaire — Luminaires marked “TYPE IC” may be installed such that insulation and other combustible materials are in contact with, and over the top of, the luminaire. Type IC luminaires are provided with thermal protection to deactivate the lamp should the luminaire be mislamped.

Inherently-protected Luminaire — A recessed luminaire that does not exceed temperatures greater than 90°C on outside surfaces even when covered with insulation and mislamped or overlapped is identified by the marking “INHERENTLY PROTECTED.”

Type Non-IC Luminaire — Recessed luminaires, except those identified as Type IC or for use in concrete only, are intended to be installed in an uninsulated or insulated ceiling (or wall), with all insulation kept a minimum distance of 3 in. from the sides of the luminaire and not placed over the luminaire such that it would entrap the heat produced by the luminaire. Other combustible materials are spaced, except at the points of support, at least 1/2 in. from the luminaire.

Type Non-IC luminaires are provided with thermal protection to deactivate the light source(s) should insulation be placed over or in contact with the luminaire.

For proper heat dissipation, Type Non-IC luminaires are intended to be installed in a cavity as follows: If not marked with any spacing information, the luminaire is intended to be installed not closer than 1/2 in. from

Light-emitting-diode Recessed Luminaires (IFAO)—Continued

any surface forming the cavity behind the recessed portion of the luminaire and not closer than 1 in. from adjacent luminaires.

Luminaires intended for marked-spacing installation are marked "INSTALL WITH MINIMUM SPACINGS BETWEEN A) CENTER-TO-CENTER OF ADJACENT LUMINAIRES: ___ INCHES; B) TOP OF LUMINAIRE AND AN OVERHEAD BUILDING MEMBER: ___ INCHES; AND C) LUMINAIRE CENTER TO SIDE BUILDING MEMBER: ___ INCHES." The marked-spacing luminaire is intended to be installed in a cavity that maintains these minimum spacings.

Individual obstructions, such as ceiling joists, barriers to maintain thermal insulation 3 in. from the luminaire, and other structural support members may be in the cavity area above the luminaire, provided (1) they are not closer than 1/2 in. from any part of the luminaire (except for points used in support of the luminaire), and (2) they do not seal off the luminaire from the remaining portion of the cavity. More than one marked-spacing luminaire may be installed in the same cavity, provided the marked spacings are maintained from each luminaire to cavity sidewalls and to adjacent luminaires. Spacings between adjacent luminaires are measured center to center, based upon the geometric center of the luminaire at the ceiling line.

Concrete-only Luminaire — A recessed luminaire exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked "FOR USE IN CONCRETE ONLY."

A Type IC or Non-IC luminaire sealed to prevent the entry of concrete may be installed in concrete providing it is marked "SUITABLE FOR USE IN POURED CONCRETE."

Suspended-ceiling Luminaire — All recessed luminaires except those marked for use in concrete only are suitable for use in suspended ceilings and may be marked "SUITABLE FOR SUSPENDED CEILING."

Recessed luminaires intended for use in suspended ceilings and provided with integral clips are marked for use with particular grid systems. When installed in accordance with this marking they comply with 410.16(C) of the NEC. Instructions for using clips to secure the luminaire to the grid are provided with the luminaire. The ability of these clips to withstand seismic disturbances has not been investigated.

Ground-mounted Recessed Luminaire — A ground-mounted recessed luminaire exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked "SUITABLE FOR GROUND-MOUNTED RECESSED ONLY."

A ground-mounted recessed luminaire suitable for installation in non-fire-resistant mediums, such as a wooden deck, is marked "SUITABLE FOR GROUND-MOUNTED RECESSED."

LUMINAIRE INSTALLATION MARKINGS

All recessed luminaires, except those marked "FOR USE IN POURED CONCRETE ONLY," are marked "BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING."

Luminaires that produce temperatures in excess of 90°C at points of mounting to the building structure are marked "INSTALL IN BUILDINGS OF FIRE RESISTANT CONSTRUCTION."

Only those luminaires with an integral junction box or wiring compartment marked "MAXIMUM OF NO. ___ AWG BRANCH CIRCUIT CONDUCTOR SUITABLE FOR ___ C PERMITTED IN BOX," have been investigated for any heat contribution added by branch circuit conductors.

Luminaires which, by their construction, do not permit access to or inspection of field-wiring connections from the front of the luminaire, after installation, are marked "ACCESS ABOVE CEILING REQUIRED" or "ACCESS BEHIND WALL REQUIRED."

Luminaires provided with polymeric recessed housings are marked "FOR USE IN ONE- AND TWO-FAMILY DWELLINGS ONLY" and "FOR USE IN NON-FIRE RATED INSTALLATIONS."

Luminaires that consist of (1) a luminaire housing and trims, or (2) a rough-in section and finishing sections are marked on each separable part with correlation markings:

- (1) For luminaire housing and trims, the housing is marked "USE WITH [manufacturer's name] [catalog number] TRIMS" and each trim is marked with the manufacturer's name and catalog number.
- (2) For rough-in and finishing sections, the rough-in section is marked "ROUGH-IN SECTION FOR USE WITH FINISHING SECTION," where the blank spaces are filled in with a) type or catalog number or b) refers to the type or catalog number located elsewhere on the label. The finishing section is marked in the same manner stating "FINISHING SECTION FOR USE WITH ROUGH-IN SECTION."

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

PRODUCT MARKINGS

All luminaires bear a model, catalog or series number or similar designation.

ADDITIONAL INFORMATION

For additional information, see Light-emitting-diode Luminaires (IFAK), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Light-emitting-diode Recessed Luminaires (IFAO)—Continued

The basic standards used to investigate products in this category are ANSI/UL 1598, "Luminaires," and ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Luminaire."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LIGHT-EMITTING-DIODE RETROFIT LUMINAIRE CONVERSION KITS (IFAR)**GENERAL**

This category covers light-emitting-diode (LED) retrofit kits intended for field installation in certified luminaires and office-furnishing lights.

This category does not cover retrofit reflector kits and luminaire conversion lamps intended for direct replacement of existing lamps without the need for modification, rewiring or component replacement in the luminaire.

The retrofit kits consist of LED light sources, installation instructions, sub-assemblies, luminaire marking labels, and assembly aids (where appropriate) to facilitate the replacement of the existing light source in complete luminaires. The retrofit installation may require modifications to the luminaire in accordance with the installation instructions provided with the retrofit kits.

The LED retrofit kits have been investigated to determine that, when installed in accordance with the manufacturer's instructions, they do not adversely affect the operation of the luminaire. A luminaire that is modified so it can no longer accept the original lamp has a label provided by the retrofit kit manufacturer affixed to the luminaire where visible during relamping that indicates the luminaire has been modified and can no longer operate the originally-intended lamp(s).

LUMINAIRE MARKINGS

LED retrofit luminaire conversion kits that permit the insertion of the original lamp types are provided with a marking for installation by the kit installer on the retrofitted luminaire. This marking is visible during relamping and states, "This luminaire has been modified and can no longer operate the originally intended lamp," and additionally identifies the replacement LED lamp type/model to be used, together with the manufacturer's name and ordering information.

LED retrofit luminaire conversion kits using linear tubular LED lamp conversions are provided with a marking for installation by the kit installer visible during relamping that indicates in text or wiring diagram how the supply connections are made to the lampholders.

RELATED PRODUCTS

Retrofit reflector kits intended for installation on fluorescent luminaires are covered under Luminaire Conversions, Retrofit (IEUQ).

Retrofit devices used to convert incandescent exit luminaires to fluorescent exit luminaires are covered under Exit Sign Conversion Kits (FWCF).

LED light sources intended to replace fluorescent lamps where it is not necessary to modify the luminaire are covered under Lamps, Self-ballasted, Light-emitting-diode Type (OOLV).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1598C, "Outline of Investigation for Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits," in addition to ANSI/UL 1598, "Luminaires," ANSI/UL 153, "Portable Electric Luminaires," and/or ANSI/UL 1286, "Office Furnishings."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

LED RETROFIT LUMINAIRE CONVERSION

FOR USE ONLY WITH (+)

IN ACCORDANCE WITH THE INSTRUCTIONS PROVIDED WITH THIS RETROFIT KIT

Control No.

Light-emitting-diode Retrofit Luminaire Conversion Kits (IFAR)—Continued

(+) PERMANENTLY-CONNECTED LUMINAIRES, FLUORESCENT LUMINAIRES, INCANDESCENT LUMINAIRES, HID LUMINAIRES, OFFICE-FURNISHING LIGHTS and/or PORTABLE LUMINAIRES; or indicate the specific luminaire model(s) and luminaire manufacturer(s)

LED RETROFIT LUMINAIRE CONVERSION

FOR USE ONLY WITH PRODUCTS DESCRIBED AND INSTALLED IN ACCORDANCE WITH THE INSTRUCTIONS PROVIDED WITH THIS RETROFIT KIT

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LIGHT-EMITTING-DIODE RETROFIT LUMINAIRE CONVERSION KITS FOR COMMERCIAL REFRIGERATORS AND FREEZERS (IFAS)

GENERAL

This category covers light-emitting-diode (LED) retrofit kits intended for field installation in certified commercial refrigerators and freezers.

This category does not cover luminaire conversion lamps intended for direct replacement of existing lamps without the need for modification, rewiring or component replacement in the commercial refrigerator or freezer.

The retrofit kits consist of LED light sources, installation instructions, subassemblies, end-product luminaire marking labels, and assembly aids (where appropriate) to facilitate the replacement of the existing light source in complete commercial refrigerators and freezers. The retrofit installation may require modifications to the end product in accordance with the installation instructions provided with the retrofit kits.

The LED retrofit kits have been investigated to determine that, when installed in accordance with the manufacturer's instructions, they do not adversely affect the operation of the commercial refrigerator or freezer. A luminaire within the end product that is modified so it can no longer accept the original lamp has a label provided by the retrofit kit manufacturer affixed to the end product where visible during relamping that indicates the luminaire has been modified and can no longer operate the originally-intended lamp(s).

LUMINAIRE MARKINGS

LED retrofit luminaire conversion kits that permit the insertion of the original lamp types are provided with a marking for installation by the kit installer on the end product. This marking is visible during relamping and states, "This luminaire has been modified and can no longer operate the originally intended lamp," and additionally identifies the replacement LED lamp type/model to be used, together with the manufacturer's name and ordering information.

LED retrofit luminaire conversion kits using linear tubular LED lamp conversions are provided with a marking for installation by the kit installer visible during relamping that indicates in text or wiring diagram how the supply connections are made to the lampholders.

RELATED PRODUCTS

LED retrofit kits intended for field installation in UL-certified luminaires or office-furnishing lights are covered under Light-emitting-diode Retrofit Luminaire Conversion Kits (IFAR).

Retrofit reflector kits intended for installation on fluorescent luminaires are covered under Luminaire Conversions, Retrofit (IEUQ).

Retrofit devices used to convert incandescent exit luminaires to fluorescent exit luminaires are covered under Exit Sign Conversion Kits (FWCF).

LED light sources intended to replace fluorescent lamps where it is not necessary to modify the luminaire are covered under Lamps, Self-ballasted, Light-emitting-diode Type (OOLV).

Optional accessories intended for installation in commercial refrigerators and freezers are covered under Refrigeration Equipment Accessories (SOSR).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1598C, "Outline of Investigation for Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits," in addition to ANSI/UL 1598, "Luminaires," and ANSI/UL 471, "Commercial Refrigerators and Freezers."

Light-emitting-diode Retrofit Luminaire Conversion Kits for Commercial Refrigerators and Freezers (IFAS)—Continued

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

LED RETROFIT LUMINAIRE CONVERSION

FOR USE ONLY WITH (+) IN ACCORDANCE WITH THE INSTRUCTIONS PROVIDED WITH THIS RETROFIT KIT

Control No.

(+) Specific commercial refrigerator or freezer model(s) and manufacturer(s)

or

LED RETROFIT LUMINAIRE CONVERSION

FOR USE ONLY WITH COMMERCIAL REFRIGERATORS AND FREEZERS IN ACCORDANCE WITH THE INSTRUCTIONS PROVIDED WITH THIS RETROFIT KIT

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SPECIAL-PURPOSE LUMINAIRES (IFAT)

Canopy Luminaires (IFAW)

GENERAL

This category covers luminaires for installation in cavities in outdoor canopies and marquees, such as used over gas station pumping islands and similar locations, in accordance with Article 410 of ANSI/NFPA 70, "National Electrical Code."

These luminaires are not intended for indoor use or in outdoor installations where thermal insulation would be installed.

PRODUCT MARKINGS

Canopy luminaires are marked "CANOPY LUMINAIRE - NOT THERMALLY PROTECTED."

All luminaires are suitable for wet locations and may be subjected to water and precipitation from the back side unless marked "FOR COVERED CEILING MOUNT ONLY."

A recessed canopy luminaire is intended to be installed not closer than 1/2 inch from any surface forming the cavity behind the recessed portion of the luminaire and not closer than 1 inch from adjacent luminaires. A recessed canopy luminaire marked "OPEN CEILING MOUNT ONLY" is intended for an uncovered ceiling only.

All luminaires bear a model, catalog or series number (or similar designation) or the words "Incandescent Canopy," "Fluorescent Canopy" or "HID Canopy," or other appropriate product type adjacent to the Certification Mark.

RELATED PRODUCTS

Luminaires intended for recessed indoor use, or areas where thermal insulation could be installed, are covered under Fluorescent Recessed Luminaires (IEVV), High Intensity Discharge Recessed Luminaires (IEXZ) and Incandescent Recessed Luminaires (IEZX).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1598, "Luminaires."

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Luminaire."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party.

Canopy Luminaires (IFAW)—*Continued*

turer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Electric-discharge Lighting Systems, Cold Cathode (IFAY)**USE**

This category covers lighting systems that incorporate electric discharge tubing with ferrule type end caps, commonly referred to as cold cathode lighting, which is electrically connected to the output of a transformer, power supply or ballast by ferrule type lampholders. Each transformer or power supply in the system is not rated more than 120 mA operating current (150 mA rated output current) when the open circuit voltage is over 7500 V, and not more than 240 mA operating current (300 mA rated output current) when the open circuit voltage is 7500 V or less. These systems are for installation in accordance with Article 410 of NFPA 70, "National Electrical Code" (NEC).

These lighting systems may incorporate transformers, power supplies or ballasts that have a marked output voltage greater than 1000 V. Such systems are not intended for use in dwellings in accordance with Article 410 of the NEC.

These lighting systems provide general illumination in accordance with Article 410 of the NEC.

INSTALLATION

Electric discharge lighting systems are provided as a system of parts that are field installed. These systems are installed using tools and techniques available only to an electrician. The systems are provided with installation instructions which define the scope of the system and method for installation. It is intended that the system installation instructions be retained with the installation to which they apply.

The Listing of a lighting system does not constitute approval of the design which is the responsibility of the manufacturer and the Authority Having Jurisdiction nor approval of the installation. The final acceptance of the field-installed lighting system is the responsibility of the Authority Having Jurisdiction.

PRODUCT MARKINGS

These lighting systems may incorporate ballasts that have marked output voltages 1000 V or less. Such systems are intended for use in dwellings and other premises when provided with circuit interrupting lampholders that de-energize the circuit during lamp replacement, unless they are marked "Not for Dwelling Use."

These systems are intended for permanent installation in indoor, dry locations unless marked in combination with the Listing Mark "Suitable for Damp Locations" or "Suitable for Wet Locations."

RELATED PRODUCTS

This category does not cover neon tubing for display windows, outline lighting or signs which are covered under Signs (UXYT).

This category does not cover field assembled neon systems in display windows, outline lighting, or skeletal neon signs which are covered under Skeletal Neon Sign and Outline Lighting Systems, Field Assembled (UZBL).

This category does not cover field installed neon outline lighting systems that outline or call attention to architectural details of a room or building. Those products are covered under Field Installed Neon Outline Lighting Systems (UYAM).

Outline lighting of the incandescent, HID or fluorescent type fabricated in factory-built sections is covered under Signs (UXYT).

Lighting systems operating at 1000 V or less are covered under Fluorescent Luminaires (IEUZ), HID Luminaires (IEXT) and Incandescent Luminaires (IEZR).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 48, "Electric Signs."

UL MARK

The Listing Mark of UL on each transformer and transformer enclosure, and the containers in which the remaining lighting system parts are packaged, or on the remaining lighting system parts themselves, referencing a specific field-installed System Number, is the only method provided by UL to identify these lighting systems covered under its Listing and Follow-Up Services. The Listing Mark for these systems includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," an issue number, "Field-Installed Electric Discharge Lighting System Part," and the words "The Listing of this lighting system is contingent upon installation according to the specifications of (Listee's Name), System No. _____ and the National Electrical Code."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or

Electric-discharge Lighting Systems, Cold Cathode (IFAY)—*Continued*

any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Landscape Lighting Systems, Low Voltage (IFDH)**USE**

This category covers low-voltage landscape lighting systems and individual components. A lighting system consists of a power unit, a number of luminaires (lighting units), connectors, and the interconnecting cable for the low-voltage circuit. The individual components include certified power units, luminaires (lighting units), and all other items needed to install a complete system in accordance with product ratings, instructions and markings.

Recessed luminaires (lighting units) intended for installation in a building wall or similar application are provided with a means to connect conduit and may be installed such that insulation is (and other combustible materials are) in contact with the luminaire (lighting unit) unless marked for installation in or on noncombustible surfaces only.

Certified components from the same company or from different companies may be used to form a complete lighting system as long as the components are used in accordance with the product ratings, markings and instructions.

The low-voltage wire or cable extending from the power-unit output circuit to, and between, the individual luminaires (lighting units) and fittings is intended to be certified SPT-3, SPT-2W, underground low-energy circuit cable, or other wire or cable rated as sunlight resistant, suitable for wet locations, and intended for direct burial.

RATINGS

Each power-unit output circuit is rated 15 V rms ac (24.2 V peak) or 30 V dc, or less; 25 A or less; and 300 VA or less. The total load connected to each output circuit of the power unit, determined by adding the wattages of the individual luminaires (lighting units), should not exceed the marked maximum permitted total lamp wattage. Two or more output circuits from the same or different power units should not be connected in parallel or series.

PRODUCT MARKINGS

Power units are marked "Indoor Use Only," "Outdoor Use Only" or "Indoor/Outdoor Use," and are intended to be installed in accordance with the power-unit markings and instructions. If located outdoors, power units are intended to be connected to a receptacle outlet with a cover assembly marked suitable for wet locations while in use. A power unit marked "Suitable for Ground Installation" is suitable for installation at or below grade level.

Luminaires (lighting units) are suitable for use outdoors or in certain indoor applications, such as atriums or shopping malls, unless marked "Outdoor Use Only." Luminaires intended only for recessed mounting in the ground or in poured concrete are marked "For installation in the ground only" or "For installation in poured concrete only," respectively.

Power units marked "For Use with Submersible Fixtures or Submersible Pumps" are intended to energize low-voltage submersible fixtures and pumps identified for use in fountains, in accordance with Article 680, Part V of the NEC, or in ponds not intended for swimming or wading in accordance with Article 682 of the NEC.

The output of power units that are limited to Class 2 levels are permitted to be marked "Class 2." Luminaires intended for use only with a Class 2 power unit are marked "Class 2 only."

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1838, "Low Voltage Landscape Lighting Systems."

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the word "Landscape" followed by the product name "Power Unit," "Lighting Unit," "Luminaire" or "Fitting," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Luminaires, Luminaire Assemblies and Luminaire Enclosures Classified for Fire Resistance (IFDL)

USE

This category covers luminaires, luminaire assemblies and luminaire enclosures investigated for use in fire-resistance designs as detailed in Fire Resistance Ratings – ANSI/UL 263 (BXUV). The luminaires, assemblies and enclosures (in conjunction with a luminaire) are intended for recessed installation in ceilings in accordance with ANSI/NFPA 70-2005, "National Electrical Code." They have been shown to provide a degree of fire resistance with the floor or roof assemblies with which they have been tested.

The luminaires and luminaire assemblies have been investigated and found to comply with applicable electrical requirements and are so labeled.

RELATED PRODUCTS

For information on related products, see Fire Resistance Ratings – ANSI/UL 263 (BXUV).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate luminaires and luminaire assemblies in this category are ANSI/UL 263, "Fire Tests of Building Construction and Materials," and ANSI/UL 1598, "Luminaires."

The basic standard used to investigate luminaire enclosures in this category is ANSI/UL 263.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**[PRODUCT IDENTITY*] CLASSIFIED FOR FIRE RESISTANCE
FIRE RESISTANCE CLASSIFICATION
DESIGN NO(S).**

SEE UL FIRE RESISTANCE DIRECTORY

Issue No.

or

**[PRODUCT IDENTITY*] CLASSIFIED FOR FIRE RESISTANCE
FIRE RESISTANCE CLASSIFICATION
SEE UL FIRE RESISTANCE DIRECTORY**

Issue No.

*** LUMINAIRE, LUMINAIRE ASSEMBLY or LUMINAIRE ENCLOSURE**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Low-voltage Luminaires for Recreational Vehicle Use (IFDQ)

USE AND INSTALLATION

This category covers low-voltage luminaires rated 24 V or less, ac or dc, intended for use in recreational vehicles, supplied by a transformer, battery, converter or similar power supply source. These luminaires are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

These luminaires are intended for use in dry locations only, unless marked "Suitable for Wet Locations."

These luminaires have been investigated for ceiling mounting as surface or recessed types. Luminaires for either ceiling or wall mounting are marked "Ceiling/Wall Mount." Luminaires limited to wall mounting are marked "Wall Mount Only," unless so constructed that they are obviously intended for wall mounting.

These luminaires are marked with the minimum temperature rating for supply conductors, except when integral lead wire is provided for connection to the supply conductors. The integral leads are of sufficient length for field splices to be located behind the ceiling or wall panel. After field splices are completed, it is intended the splices be positioned in a space not affected by the luminaire lamp heat.

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Low-voltage Luminaires for Recreational Vehicle Use (IFDQ) – Continued

The basic standard used to investigate products in this category is ANSI/UL 234, "Low Voltage Lighting Fixtures for Use in Recreational Vehicles."

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low Voltage RV Luminaire," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Low-voltage Lighting Systems, Power Units, Luminaires and Fittings (IFDR)

USE

This category covers low-voltage luminaires, low-voltage lighting power units, and low-voltage luminaire systems. This category also covers luminaire fittings that are parts and/or subassemblies intended for final assembly into low-voltage luminaires in the field.

These luminaires and fittings are rated 30 V (42.4 V peak) or less and are intended for connection to an isolating type power unit. Sets of low-voltage luminaires may include the power unit and interconnecting cabling to make up a low-voltage luminaire system.

This category also covers low-voltage bare conductor lighting systems incorporating luminaires which may be repositionable along the bare supply conductors that also support the luminaire. The power unit for these systems is provided with integral protection that de-energizes the output upon overloading or inadvertent shorting of exposed uninsulated live parts of the system.

This category also covers low-voltage linear track conductor-type lighting systems with remote low-voltage power supplies. Also included are low-voltage "mono-point," "dual-point" and "multi-point" low-voltage track-type systems with removable luminaires, where the power supply may be remote or may be in a canopy integral with the track.

INSTALLATION INSTRUCTIONS

The products covered under this category are intended for installation in accordance with Article 411 of ANSI/NFPA 70, "National Electrical Code" (NEC). Installation instructions accompanying the product describe the wiring method intended to be used to supply the luminaires and power units.

Certain lighting systems are designed and investigated for the luminaire to be supplied and supported by an exposed conductor, cord, rail or track. The wiring method intended for all other luminaires is (a) that required for Class 2 circuits in Article 725 of the NEC when the circuit is supplied by a Class 2 power unit, or (b) fixed wiring in accordance with Chapter 3 wiring methods of the NEC.

Power units intended to supply Class 2 luminaire circuits or an exposed conductor, cord, rail or track that supports the luminaires are intended to be connected to the branch circuit either with a factory-connected power-supply cord or by fixed wiring. These power units are intended to be connected to the output circuit by (a) wiring means consistent with that involved with the supplied luminaire, or (b) fixed wiring. All other power units are designed for connection to the branch circuit and the output circuit with a fixed wiring means.

Luminaires intended for recessed or undershelf installation into a cabinet are provided with installation instructions depicting the intended use.

Some lighting systems include track or rail types of sections that (a) support and provide power to low-voltage luminaires, and (b) are intended to be bent by the installer as needed for the installation. Care should be taken to bend these system parts following the method identified in the installation instructions and so that no part damage occurs. The radii of bends should be no less than specified by the manufacturer.

Care should be taken to adhere to all manufacturer-specified minimum spacings between a luminaire and a nearby object or surface that can be damaged from heat from the luminaire or that can adversely affect natural air movement around the luminaire. Examples include the ceiling above a wall-mounted luminaire, the adjoining wall of an inside corner, the wall near a ceiling-mounted luminaire, alcove surfaces, a valance, and curtains. Where minimum spacings are not specified by the manufacturer or the specific field configuration of a nearby wall, ceiling, or other object is not

Low-voltage Lighting Systems, Power Units, Luminaires and Fittings (IFDR)—Continued

addressed in the manufacturer's installation instructions, care should be taken to minimize the heating of nearby objects and maximize air movement around the luminaire.

PRODUCT MARKINGS

Luminaires and fittings restricted for connection to a Class 2 source of supply are identified by product markings.

These luminaires and fittings are intended for surface mounting, suspended or recessed installation and are marked for either dry, damp or wet locations. A luminaire or fitting marked for wet locations is rated 15 V (21.2 V peak) maximum unless live parts are made inaccessible to contact during normal use. See Luminaires and Fittings (HYXT) for additional installation markings.

Recessed units (luminaires and power units) marked "Type IC" or "Inherently Protected" may be installed in accordance with Section 410.66 of the NEC, such that insulation and other combustible materials are in contact with and over the top of the unit.

All recessed units not marked "Type IC" or "Inherently Protected" are intended to be installed such that insulation is not placed over the top or within 3 inches of the sides of the unit, and other combustible materials are spaced, except at the points of support, at least 1/2 inch from the unit.

Power units shipped separately from the bare conductor lighting system are marked to identify the associated bare conductor system series number and manufacturer.

RELATED PRODUCTS

Low-voltage landscape lighting systems consisting of a remote power supply source, flexible cord, interconnecting means and relocatable outdoor use lighting assemblies are covered under Landscape Lighting Systems, Low Voltage (IFDH).

Luminaires incorporating an integral transformer or power supply for supplying the luminaire's low-voltage lamp are covered under Luminaires, Portable (QOWZ), or Portable Cabinet Luminaires (QOV) if portable, and Incandescent Surface-mounted Luminaires (IEZR) if not portable.

Low-voltage luminaires intended for connection only to 24 V or less source of supply in recreational vehicles are covered under Low-voltage Luminaires for Recreational Vehicle Use (IFDQ).

Low-voltage flexible lighting products are covered under Flexible Lighting Products (ILG).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2108, "Low Voltage Lighting Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Low Voltage Luminaire," "Low Voltage Recessed Luminaire," "Low Voltage Cabinet Luminaire," "Low Voltage Luminaire Power Supply," "Low Voltage Lighting System," "Low Voltage Luminaire System," "Low Voltage Luminaire Fitting," "Low Voltage Track Lighting," or other appropriate product name as shown in the individual Listings.

The term "Fixture" may be used in lieu of "Luminaire" in the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Medical/dental Luminaires (IFDT)

GENERAL

This category covers task-lighting products, such as examination room lights, illuminated eye charts and the like, intended for installation and use in hospitals, nursing homes, medical care centers, medical and dental offices, and similar health care facilities, outside the defined patient vicinity. The patient vicinity is defined as areas in which patients are normally cared for, and it is the space with surfaces likely to be contacted by the patient or an attendant who can touch the patient. Patient vicinity includes a space within the room 6 ft (1.83 m) beyond the perimeter of the bed (examination table, dental chair, treatment booth, and the like) in its intended location, and extending vertically 7-1/2 ft (2.29 m) above the floor.

These lighting products have been investigated from the standpoint of electrical, fire and casualty hazards only. Lighting products investigated as patient care equipment, with respect to the isolation and leakage current requirements of UL 60601-1, "Medical Electrical Equipment, Part 1: General

Medical/dental Luminaires (IFDT)—Continued

Requirements," are covered under Medical Equipment (PIDF). Other hazards, including those which may result from use of this equipment in the presence of flammable anesthetics, have not been investigated. The effect on a patient of simultaneous use of this equipment with other electrical apparatus and the physiological effects, beneficial or otherwise, which may be produced by this equipment, have not been investigated.

PRODUCT MARKINGS

All luminaires bear a model, catalog or series number (or similar designation) adjacent to the Certification Mark.

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1598, "Luminaires."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Medical Examining Room Light" or "Eye Chart," or the name of the specific type of product as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Stage and Studio Luminaires, Accessories and Connector Strips (IFDZ)

USE

This category covers stage and studio luminaires, accessories and connector strips rated 600 V or less, for use in theaters, studios and similar locations in accordance with Articles 520 and 530 of ANSI/NFPA 70, "National Electrical Code." Connector strips are defined as a wireway mounted on rigging or to the building structure above or adjacent to the luminaires it supplies. Stage and studio luminaires, accessories and connector strips are not intended for residential use.

LUMINAIRE INSTALLATION MARKINGS

Stage and studio luminaires, accessories and connector strips are marked "Not For Residential Use."

Some stage luminaires are marked with a lamp replacement marking stating "CAUTION — Risk of Fire — Use With Max ___ Watt Lamp" where the space is filled in with a number specifying the maximum wattage.

Stage luminaires intended for use with a pressurized tungsten-halogen lamp with an integral outer envelope and not requiring a separate containment enclosure are marked "WARNING — Risk of fire," and either "Use only lamp type ___," or "Use double envelope tungsten-halogen lamp that is marked on the lamp or carton as suitable for use without an additional shield."

Stage luminaires using high-pressure lamps may be marked with one or more of the following:

"WARNING — Risk of possible lamp explosion. Service and maintenance should be performed only by qualified personnel as determined by the high-pressure luminaire manufacturer. Protective clothing and procedures as outlined in the manufacturer's manual must be followed."

"WARNING — Risk of possible lamp explosion. Allow lamp system to remain unenergized and to cool for minimum ___ minutes before opening lamp access door."

"CAUTION — Use only high-pressure lamp of proper size and type in this lamp system."

"CAUTION — Serious injury may result from the generation of ozone by this lamp system. A proper means of venting must be provided."

Some stage luminaires are intended to be mounted within a restricted range of mounting or adjustment means and are marked "WARNING — Risk of fire and electric shock," followed by a description of the mounting or adjustment restrictions.

RELATED PRODUCTS

Stage and studio luminaires and accessories employing or associated with light-emitting-diode (LED) illumination are covered under Light-emitting-diode Stage and Studio Luminaires and Accessories (IFEC).

ADDITIONAL INFORMATION

For additional information, see Special-purpose Luminaires (IFAT), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Stage and Studio Luminaires, Accessories and Connector Strips (IFDZ)—Continued

The basic standard used to investigate products in this category is UL 1573, "Stage and Studio Luminaires and Connector Strips."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Stage Lighting Unit," "Stage Luminaire," "Stage Border Lighting Unit," "Stage Border Luminaire," "Stage Luminaire Accessory," "Connector Strip," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Light-emitting-diode Stage and Studio Luminaires and Accessories (IFEC)

USE

This category covers light-emitting-diode (LED) stage and studio luminaires and accessories rated 600 V or less, intended for use in theaters, studios and similar locations in accordance with Articles 520 and 530 of ANSI/NFPA 70, "National Electrical Code." LED stage and studio luminaires and accessories are not intended for residential use.

LUMINAIRE INSTALLATION MARKINGS

LED stage and studio luminaires and accessories are marked "Not for Residential Use."

Some LED stage and studio luminaires are intended to be mounted within a restricted range of mounting or adjustment means and are marked "WARNING — Risk of fire and electric shock," followed by a description of the mounting or adjustment restrictions.

RELATED PRODUCTS

Stage and studio luminaires and accessories employing or related to light sources other than light-emitting diodes are covered under Stage and Studio Luminaires, Accessories and Connector Strips (IFDZ).

All connector strips intended for use in stage and studio applications are covered under Stage and Studio Luminaires, Accessories and Connector Strips (IFDZ).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1573, "Stage and Studio Luminaires and Connector Strips," and ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate:

- "Light-emitting-diode Stage Luminaire" (or "LED Stage Luminaire")
- "Light-emitting-diode Stage Border Luminaire" (or "LED Stage Border Luminaire")
- "Light-emitting-diode Stage Luminaire Accessory" (or "LED Stage Luminaire Accessory")
- "Light-emitting-diode Studio Luminaire" (or "LED Studio Luminaire")
- "Light-emitting-diode Studio Luminaire Accessory" (or "LED Studio Luminaire Accessory")

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Retrofit Low-voltage-luminaire Conversion Kits (IFES)

GENERAL

This category covers retrofit kits intended for field installation in certified luminaires to provide conversion to a low-voltage lighting system.

Retrofit Low-voltage-luminaire Conversion Kits (IFES)—Continued

This category does not cover luminaire conversion lamps intended for direct replacement of existing lamps without the need for modification, rewiring or component replacement in the luminaire.

The retrofit kits may consist of light sources, electronic subassemblies (ballasts, LED drivers, or controllers), luminaire components, installation instructions and marking labels, and assembly aids (where appropriate) to facilitate the conversion. Modifications may include provisions for connection of one or more luminaires to an isolating-type power unit with outputs rated within the Class 2 voltage limits of ANSI/NFPA 70, "National Electrical Code" (NEC). The power unit is not necessarily supplied with the retrofit kit.

The retrofit kits have been investigated to determine that, when installed in accordance with the manufacturer's instructions, the retrofitted luminaire fully complies with the applicable requirements (see **REQUIREMENTS** below). A kit that modifies a luminaire so it can no longer accept the original lamp includes a label to be affixed to the luminaire, where visible during relamping, that indicates the luminaire has been modified and can no longer operate the originally intended lamp(s).

INSTALLATION INSTRUCTIONS

Installation instructions accompanying the product describe the wiring method intended to be used to supply the luminaires and power units in accordance with Article 411 of the NEC.

Some retrofit kits are intended to adapt the luminaire to be used with a certified suspended-ceiling-grid low-voltage lighting system. The applicable lighting system is identified on certain parts of these kits and in the installation instructions. The wiring method intended for all other luminaires is either (a) that required for Class 2 circuits in accordance with Article 725 of the NEC, when the circuit is supplied by a Class 2 power unit, or (b) fixed wiring in accordance with Chapter 3 of the NEC.

Power units intended to supply Class 2 luminaire circuits or a certified suspended-ceiling-grid low-voltage lighting system are intended to be connected to the branch circuit either with a factory-connected power-supply cord or by fixed wiring. These power units are intended to be connected to the low-voltage lighting system or individual luminaires, as applicable, by (a) wiring means consistent with that involved with the supplied luminaire or suspended-ceiling-grid low-voltage lighting system, or (b) fixed wiring. Power units with other than Class 2 output are designed for connection to the branch circuit and the output circuit with a fixed wiring means.

LUMINAIRE MARKINGS

Retrofit luminaire conversion kits that replace the original lamp and still permit the insertion of the original lamp types are provided with a marking for installation by the kit installer on the retrofitted luminaire. This marking is visible during relamping and states, "This luminaire has been modified and can no longer operate the originally intended lamp," and additionally identifies the replacement lamp type/model to be used, together with the manufacturer's name and ordering information.

LED retrofit luminaire conversion kits using linear tubular LED lamp conversions are provided with a marking for installation by the kit installer visible during relamping that indicates in text or wiring diagram how the supply connections are made to the lampholders.

RELATED PRODUCTS

Retrofit reflector kits intended for installation on fluorescent luminaires are covered under Luminaire Conversions, Retrofit (IEUQ).

Retrofit kits used to convert luminaires to LED illumination systems in accordance with ANSI/UL 1598, "Luminaires," and that are provided with integral LED power supplies or power modules are covered under Light-emitting-diode Retrofit Luminaire Conversion Kits (IFAR).

Retrofit devices used to convert light sources from one type to another in exit luminaires such as converting incandescent to LED are covered under Exit Sign Conversion Kits (FWCF).

LED light sources intended to replace fluorescent lamps where it is not necessary to modify the luminaire are covered under Lamps, Self-ballasted, Light-emitting-diode Type (OOLV).

Retrofit kits may include parts to adapt luminaires for use with a suspended-ceiling-grid low-voltage lighting system. These parts and the resulting converted luminaire are additionally investigated under Suspended-ceiling-grid Low-voltage Lighting System Accessories (IFFC).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 2108, "Low Voltage Lighting Systems," and ANSI/UL 1598B, "Supplemental Requirements for Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products

Retrofit Low-voltage-luminaire Conversion Kits (IFES)—Continued

includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

RETROFIT LOW-VOLTAGE-LUMINAIRE CONVERSION

FOR USE ONLY WITH +

IN ACCORDANCE WITH THE INSTRUCTIONS PROVIDED WITH THIS RETROFIT KIT

Control No.

+ PERMANENTLY CONNECTED LUMINAIRES, FLUORESCENT LUMINAIRES, INCANDESCENT LUMINAIRES, HID LUMINAIRES, OFFICE-FURNISHING LIGHTS and/or PORTABLE LUMINAIRES; or indicate the specific luminaire model(s) and luminaire manufacturer(s)

or

RETROFIT LOW-VOLTAGE-LUMINAIRE CONVERSION

FOR USE ONLY WITH PRODUCTS DESCRIBED AND INSTALLED

IN ACCORDANCE WITH THE INSTRUCTIONS PROVIDED WITH THIS RETROFIT KIT

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Submersible Luminaires (IFEV)

USE

This category covers submersible luminaires intended for installation in accordance with Article 680 of ANSI/NFPA 70, "National Electrical Code," in fountains and similar water-containing vessels not intended to accommodate the complete or partial immersion of persons. For certifications of luminaires intended for use in swimming pools, spas, hot tubs and other vessels intended to accommodate persons, see Luminaires and Forming Shells (WBDT).

This category also covers submersible junction boxes intended for use with submersible luminaires and other submersible fountain equipment.

Luminaires investigated for operation only while submerged in water are marked "Submerge Before Lighting," or with equivalent wording, and such marking is visible after installation of the luminaire.

Submersible luminaires have been investigated for both outdoor and indoor use.

Dry-niche Submersible Luminaire — These luminaires are intended for permanent installation only in the wall of a fountain unless accompanying installation instructions describe the additional option of installation in the bottom of the fountain. These luminaires are designed for servicing from the rear in a passageway behind the fountain wall or, if mounted in the bottom of the fountain, in a tunnel underneath the fountain. For purposes of installation, maintenance or servicing, the luminaire may consist of two separable parts. One part includes a factory-installed length of flexible cord terminating in an attachment plug, and the second part includes a receptacle for the attachment plug and a splice compartment in which the branch-circuit conductors are connected.

Wet-niche Submersible Luminaire — These luminaires are intended to be installed only in the wall of a fountain unless accompanying installation instructions describe the additional option of installation in the bottom of the fountain. These luminaires are intended for installation in a permanently installed luminaire housing (forming shell) in which the luminaire will be completely surrounded by water. These luminaires are marked to indicate the proper housings with which they are to be used. These luminaires are provided with a factory-installed, permanently attached flexible cord with an exposed length of not less than 12 ft. The flexible cord is confined in the luminaire housing by the luminaire and permits the luminaire to be removed from the luminaire housing and to be lifted to the fountain deck for servicing without lowering the water level or disconnecting the luminaire from the branch-circuit conductors. Luminaires with longer cords are available for installations where the junction box or splice enclosure is so located that a 12-ft-long cord will not permit luminaire removal from the luminaire housing and placement on the deck for servicing. To reduce the risk of product damage, any cord length in excess of that necessary for servicing should be trimmed from the supply end rather than stored in the luminaire housing.

Forming Shell (Housing) for Wet-niche Submersible Luminaires — These are structures designed to support a mating wet-niche luminaire, for mounting in a fountain structure. Forming shells are marked to indicate the luminaires with which they have been investigated for use.

No-niche Submersible Luminaire — These luminaires are intended to be installed only on the walls of a fountain unless accompanying installation instructions describe the additional option of installation on the bottom of the fountain. These luminaires are mounted to a bracket permanently

Submersible Luminaires (IFEV)—Continued

secured in or on the wall or bottom with the luminaire completely surrounded by water, and are marked to indicate the mounting brackets for which they have been investigated for use. These luminaires are provided with a factory-installed, permanently attached flexible cord with an exposed length of not less than 12 ft that is confined by the luminaire and fountain wall or bottom. The flexible cord permits the luminaire to be removed from the mounting bracket and to be lifted to the fountain deck for servicing without lowering the water level or disconnecting the luminaire from the branch-circuit conductors. Luminaires with longer cords are available for installations where the junction box or splice enclosure is so located that a 12-ft-long cord will not permit luminaire removal from the mounting bracket and placement on the deck for servicing. To reduce the risk of product damage, any cord length in excess of that necessary for servicing should be trimmed from the supply end rather than stored between the luminaire and fountain wall.

Mounting Brackets for No-niche Submersible Luminaires — These are structures designed to support a mating no-niche luminaire, for mounting in or on a fountain structure. Mounting brackets are marked to indicate the luminaires with which they have been investigated for use.

Special-use Submersible Luminaire — These luminaires are intended to rest directly on the fountain floor or may be otherwise located in the fountain. The luminaires are provided with a permanently attached exposed flexible cord intended to be routed into a submersible junction box, or the luminaires have other means for permanent connection to the supply circuit.

ACCESSORIES

This category also covers accessory devices and kits intended to be field installed for the purpose of modernizing a luminaire, such as to convert the luminaire from incandescent to LED technology. These accessories include instructions that identify the specific luminaire(s) for which the accessory is intended and that do not require special knowledge or skills beyond that normally required for user maintenance activities, such as lamp replacement. After installation of a certified accessory, the installed luminaire is expected to comply with the same requirements and perform in a comparable manner as a new luminaire, relative to safety risks.

REBUILT PRODUCTS

This category also covers submersible luminaires that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt submersible luminaires are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt submersible luminaires are subject to the same requirements as new submersible luminaires.

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 676, "Luminaires and Submersible Junction Boxes."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Mounting Bracket for No-niche Luminaire," "Housing for Wet-niche Luminaire," "Wet-niche Submersible Luminaire," "Dry-niche Submersible Luminaire," "No-niche Submersible Luminaire," "Special-use Submersible Luminaire," "Submersible Junction Box," "Submersible Luminaire Accessory," or other appropriate product name as shown in the individual Listings. Alternatively, the luminaires may be designated "Submersible Luminaire, (Wet-) (Dry-) (No-) Niche Type," as appropriate.

For rebuilt products, the word "Rebuilt" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Suspended-ceiling-grid Low-voltage Lighting Systems (IFFA)

USE

This category covers low-voltage lighting systems intended for permanent installation and use in a suspended-ceiling grid in accordance with Article 411 of ANSI/NFPA 70, "National Electrical Code" (NEC).

These lighting systems are intended to be installed in a suspended-ceiling grid that provides mechanical support for the ceiling tiles and provides electrical connections between the low-voltage power supply and low-voltage luminaires.

These lighting systems consist of the following system components:

1. An isolating-type low-voltage power supply operating at 30 V (42.4 V

Suspended-ceiling-grid Low-voltage Lighting Systems (IFFA)—Continued

- peak) or less and not exceeding Class 2 power limits.
- A grid-rail power distribution system with uninsulated busbar conductors, similar to track lighting, to provide power from the Class 2 power supply to one or more Class 2 powered luminaires.
 - Class 2 powered luminaires that may be recessed into the suspended ceiling, surface mounted on the room side of the ceiling, or located below the suspended ceiling.

The lighting systems are intended for indoor dry locations and commercial use only and may be used in air-handling spaces when identified for such use.

The system components also include interconnecting cables and connectors unless the connectors are suitable for field wiring.

Suspended-ceiling-grid low-voltage lighting systems are not intended for use in:

- Hazardous (classified) locations as specified in NEC Articles 500 – 517.
- General patient-care areas or critical patient-care areas as defined by NEC Article 517.
- Emergency systems as defined by NEC Article 700.

Suspended-ceiling-grid low-voltage lighting systems are not intended for contact with thermal insulation as specified in NEC Article 410.

Suspended-ceiling-grid rails with uninsulated busbar conductors are not intended for field cutting unless identified for such use.

INSTALLATION INSTRUCTIONS

These products are intended for installation in accordance with Article 411 of the NEC. Installation instructions accompanying the product describe the Class 2 wiring method intended to be used between the Class 2 power supply, the low-voltage grid-rail power distribution system, and the low-voltage luminaires in accordance with Articles 411 and 725 of the NEC. The Class 2 power supply is intended for permanent installation in accordance with the wiring methods in Chapter 3 of the NEC.

All electrical connections are intended for installation by qualified electrical installers.

The mechanical components of the system, including support of the grid rails, is intended to be in accordance with the “International Building Code” and the “International Mechanical Code.”

Each smallest unit package or carton is provided with installation instructions that contain a) a product description, b) a statement to identify the suspended-ceiling low-voltage lighting system, c) a description of the part(s) intended to be used, and d) instructions describing how the part(s) are intended to be installed.

Each unit package or carton of suspended-ceiling low-voltage lighting system grid-rail-bus section is provided with installation instructions that identify the system series number or model name and model or catalog number of the system. The installation instructions also specify the electrical ratings of the system and identify the method of mounting.

PRODUCT MARKINGS

All suspended-ceiling-grid low-voltage lighting system components are marked with:

- Listee’s name, trade name, trademark or other descriptive marking by which the manufacturer responsible for the product may be identified.
- A distinctive catalog number or the equivalent.
- The electrical rating (at both power-feed connector installation points).
- The date or other dating period of manufacture of the product not exceeding any three consecutive months.

Air-handling Use — Each nonmetallic suspended-ceiling-grid low-voltage lighting system component (e.g., accessory, grid rail, connector) suitable for installation in air-handling spaces is marked “Suitable for Use in Air-handling Spaces,” “Suitable for Use in Other Environmental Air Space in Accordance with Section 300.22(C) of the National Electrical Code,” “Suitable for Use in Air-handling Spaces in Accordance with Section 300.22(C) of the National Electrical Code,” or equivalent wording. Products that bear this marking are suitable for installation in accordance with NEC Section 300.22(C), Chapter 4 of ANSI/NFPA 90A, “Installation of Air-Conditioning and Ventilating Systems,” Section 602 of the “International Mechanical Code,” and Section 602 of the “Uniform Mechanical Code.”

Class 2 Luminaires — In addition to the required markings specified above for all components, each luminaire is marked with the specific suspended-ceiling-grid low-voltage lighting system for which it is intended to be used.

Class 2 Power Supplies — In addition to the required markings specified above for all components, each power supply is marked with the specific suspended-ceiling-grid low-voltage lighting system for which it is intended to be used.

Connectors — In addition to the required markings specified above for all components, the connectors are marked with:

- The connector type (e.g., ceiling-grid load connector, in-plane load

Suspended-ceiling-grid Low-voltage Lighting Systems (IFFA)—Continued

connector, power-feed connector) and a distinctive catalog number or the equivalent.

- Electrical rating in volts and amperes (watts or VA is optional).
- For a direct-current (dc) system, the polarity of the specific conductor opening for a power-feed connector: “Positive,” “Pos.” or “+” and “Negative,” “Neg.” or “-.”

RELATED PRODUCTS

See Low-voltage Lighting Systems, Power Units, Luminaires and Fittings (IFDR).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2577, “Outline of Investigation for Suspended Ceiling Grid Low Voltage Lighting Systems.”

Discrete nonmetallic components of suspended-ceiling-grid low-voltage lighting systems marked suitable for use in air-handling spaces have been additionally investigated to UL 2043, “Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces.”

Suspended-ceiling-grid rails incorporating nonmetallic components intended to be installed in air-handling spaces have been additionally investigated to ANSI/UL 723, “Test for Surface Burning Characteristics of Building Materials.” The specific ceiling-finish materials are investigated as a ceiling-grid system and the system components are described in the individual certifications and in the installation instructions. The system is comprised of materials with a flame spread of not over 25 without evidence of continued progressive combustion and a smoke-developed index of not over 50.

Suspended-ceiling-grid rails incorporating nonmetallic components forming the finished ceiling have been additionally investigated to ANSI/UL 723. The specific ceiling-finish materials are investigated as a ceiling-grid system and the system components are described in the individual certifications and in the installation instructions. The system is comprised of materials with a flame spread of not over 25 without evidence of continued progressive combustion and a smoke-developed index of not over 450.

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Grid Bus Rail,” “Low-voltage Suspended-ceiling Power Supply,” “Low-voltage Suspended-ceiling Luminaire,” “Low-voltage Suspended-ceiling Recessed Luminaire,” or other appropriate product name as shown in the individual Listings.

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Suspended-ceiling-grid Low-voltage Lighting System Accessories (IFFC)**USE**

This category covers suspended-ceiling low-voltage lighting system accessories that are parts and/or subassemblies intended for field installation in specific suspended-ceiling-grid low-voltage lighting systems. They include low-voltage Class 2 power supplies, power and load connector assemblies, low-voltage luminaires, and other accessories intended for installation in a specific suspended-ceiling-grid low-voltage lighting system of another manufacturer in accordance with the accessory unit manufacturer’s instructions.

These accessories have been investigated to determine that, when installed and used in accordance with the manufacturer’s instructions, they do not adversely affect the operation of the complete suspended-ceiling-grid low-voltage lighting system.

RELATED PRODUCTS

For information on product markings, installation instructions and other requirements, see Suspended-ceiling-grid Low-voltage Lighting Systems (IFFA).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Suspended-ceiling-grid Low-voltage Lighting System Accessories (IFFC)—Continued

The basic requirements used to investigate products in this category are contained in UL Subject 2577, "Outline of Investigation for Suspended Ceiling Grid Low Voltage Lighting Systems."

Discrete nonmetallic components of suspended-ceiling-grid low-voltage lighting systems marked suitable for use in air-handling spaces have been additionally investigated to UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces."

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT NAME*]

FOR USE WITH SUSPENDED-CEILING-GRID LOW-VOLTAGE LIGHTING SYSTEM

MODEL _____

MANUFACTURED BY _____

Control No. _____

* **LOW-VOLTAGE LUMINAIRE, CLASS 2 POWER SUPPLY**, or other appropriate product name as shown in the individual Classifications

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Track Lights and Tracks (IFFR)

USE

This category covers track-lighting systems for installation on or recessed into ceilings and walls and intended to be connected to a source of supply by a fixed wiring method only in accordance with Article 410, Part R of ANSI/NFPA 70, "National Electrical Code."

These track-lighting systems are intended for installation in dry locations only.

Track-lighting systems consist of the following parts, each bearing a Certification Mark: 1) track sections, 2) connectors to connect track sections together and/or track sections to the supply, 3) end caps that insert into the last track sections in a run, 4) lighting assemblies, 5) electrical accessory parts, such as low-voltage adapters, and 6) accessory parts, such as mounting hardware, track section hooks and fixture assembly light deflectors.

The following components are not part of the certified track-lighting system and are not acceptable for use with a certified track-lighting system: 1) receptacle adapters that when inserted into a track section will accommodate attachment-plug-connected products and 2) power-supply-cord connectors that when inserted into the end of a track section enables the track system to serve as a power-supply cord connected to its source of supply.

INSTALLATION INSTRUCTIONS

Each smallest unit package or carton is provided with installation instructions that contain a) a product description, b) a statement to identify the track system, c) description of the part or parts intended to be used with and d) instructions describing how the part or parts are to be installed to the track system.

Each track section is provided with installation instructions that identify the track system series number or model name and model or catalog number of the track. The installation instructions also specify the electrical ratings of the track system and identify the intended type of mounting (pendant or surface) and distance between mounting clips, screws and stems.

Additional instructions and limitations of use for track-lighting systems are specified in the Important Safety Instructions provided with each track section.

Those track systems with track sections that may be cut to length in the field by the installer are provided with installation instructions that indicate the proper method of cutting.

Those track systems intended to have the mounting holes in each track section drilled by the installer are provided with a drill guide in the center of each track section and include in the accompanying installation instructions the proper location of the mounting holes.

INSTALLATION MARKING

Track systems that are designed only for use with mounting clips are identified by marking on each track section "For Clip Mounting Only."

Track systems that are intended only for nonpendant mounting are identified by marking each track section "Do not pendant mount this track such as by stems or wires."

Track systems that are intended for recessed installation are marked "Suitable for Use in Poured Concrete," or "For use in _____" if intended to

Track Lights and Tracks (IFFR)—Continued

be an integral part of a suspended-ceiling grid. The blank space is filled in with the manufacturer's name and catalog number or product description of the structural building system with which the track system is to be used.

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1574, "Track Lighting Systems."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Track Lighting Fitting."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUMINAIRE FITTINGS (IFFX)

GENERAL

This category covers luminaire fittings, which are incomplete parts and/or subassemblies of luminaires, intended for final assembly into luminaires in the field. Completely assembled luminaires incorporating luminaire fittings may be submitted to UL as part of the Factory Inspection and Follow-Up Service Program for fluorescent, incandescent and high-intensity-discharge luminaires and, if found suitable, certified as luminaires. Smoothness and thickness of wireways, methods for connection to a recognized wiring system, suitability of splice enclosure and means for inspecting splices are typical considerations given to the completed luminaire which cannot be judged until the fittings are assembled into a complete luminaire.

This category also covers luminaire poles that do not exceed 12 ft in length, measured from the bottom of the base, or from the intended grade level of poles for installation partially in ground.

A complete luminaire assembled from certified luminaire fittings will bear the luminaire Certification Mark appropriate to the luminaire category if produced under UL's Factory Inspection and Follow-Up Service Program. The determination of the acceptability of an assembly not so labeled rests with the Authority Having Jurisdiction.

PRODUCT MARKINGS

All fittings are marked indicating the location where they can be used:

Fittings marked "DRY LOCATIONS ONLY" are intended to be installed in indoor, dry locations.

Fittings marked "SUITABLE FOR DAMP LOCATIONS" are intended to be installed in damp or dry locations.

Fittings marked "SUITABLE FOR WET LOCATIONS" are intended to be installed in wet, damp or dry locations.

The locations are defined in Electrical Equipment for Use in Ordinary Locations (AALZ) and in ANSI/NFPA 70, "National Electrical Code."

All luminaire fittings bear a model, catalog or series number (or similar designation) adjacent to the Certification Mark.

RELATED PRODUCTS

Certain devices in the categories of Sign Accessories (UYMR), Surface Metal Raceways (RJBT), Surface Nonmetallic Raceways (RJTX), Surface Metal Raceway Fittings (RJPR) and Surface Nonmetallic Raceway Fittings (RJYT) are also suitable for use with luminaire fittings.

Luminaire poles exceeding 12 ft in length are covered under Luminaire Poles (IEUR).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1598, "Luminaires," in addition to standards applicable to the device(s) constituting the fitting.

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word

Luminaire Fittings (IFFX)—Continued

"LISTED," a control number, and the product name "Luminaire Fitting," "Swivel Joint" or "Disconnect Fitting," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Fixture Fittings for Track Lighting (IFGT)

USE

This category covers fixture fittings that are parts and/or subassemblies intended for field installation in specific track-lighting systems, identified by catalog number and company name. They include track-lighting-fixture units intended for installation in specific existing field-installed tracks of another manufacturer in accordance with the fixture unit manufacturer's instructions.

These fittings have been investigated to determine that, when installed and used in accordance with the manufacturer's instructions, they do not adversely affect the operation of the complete track-lighting system.

ADDITIONAL INFORMATION

For additional information, see Luminaire Fittings (IFFX), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1574, "Track Lighting Systems."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**FIXTURE FITTING FOR TRACK LIGHTING
CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
FOR USE ONLY WITH TRACK LIGHTING MODEL _____
MANUFACTURED BY _____**

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RECESSED LUMINAIRE TRIMS (IFGW)

USE

This category covers trims intended for field installation in specified recessed incandescent luminaires. These products have been investigated to determine that, when used in accordance with the manufacturer's instructions, they comply with the appropriate requirements for the complete luminaire.

This category covers trims for use with newly installed luminaires and as retrofit devices intended to be used to replace existing trims. The specified luminaires with which the trims have been investigated are identified in the Certification Mark on the trim.

PRODUCT MARKINGS

Each trim is marked with its catalog number and manufacturer. Each trim is also marked with the lamp-replacement markings, and may include the blinking-light-warning marking.

RELATED PRODUCTS

Reflector retrofit kits used to add or replace reflectors in fluorescent luminaires are covered under Luminaire Conversions, Retrofit (IEUQ).

Retrofit devices used to convert incandescent exit fixtures to fluorescent exit fixtures are covered under Exit Sign Conversion Kits (FWCF).

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate retrofit luminaire trim conversions in this category is ANSI/UL 1598, "Luminaires."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products

Recessed Luminaire Trims (IFGW)—Continued

includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

RECESSED LUMINAIRE TRIM

**FOR USE WITH [identification of which luminaires are to be used] ONLY
Control No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**LUMINAIRES AND FITTINGS FOR
USE IN HAZARDOUS LOCATIONS
(IFGZ)**

**LUMINAIRES FOR USE IN HAZARDOUS
LOCATIONS (IFUX)**

USE AND INSTALLATION

This category covers incandescent lamp, fluorescent lamp, high-intensity-discharge lamp, or surgical-type luminaires for use in hospital operating rooms, and luminaires for use with germicidal lamps.

Seals are provided in the luminaires for Class I, Division 1 hazardous locations between lamp chambers and wiring chambers for supply line connections. The luminaires have been tested with respect to safe maximum external temperatures.

Luminaires certified for use in any of the groups under Class II, Division 1 and 2 hazardous locations have been tested for dusttightness and safe operation in the presence of the specific combustible dusts. The equipment should be kept clean and should be carefully maintained so as not to allow combustible dust to accumulate on equipment or in buildings. The operating temperature of any parts which may be in contact with the combustible dust is marked on the luminaire if this temperature exceeds 100°C.

Luminaires for Class I, Division 2 only, of no specific hazardous location groups or of one or more of the hazardous location groups are included below. Such certifications are under hazardous location group headings with the suffix "Division 2 only" or under the heading "Class I, Division 2 only."

Luminaires without guards should be used only where not subject to breakage.

Luminaires intended for use with germicidal lamps are marked with a caution notice regarding their installation so that users will not be subjected to injurious radiations.

Luminaires suitable for locations having deposits of readily combustible paint residue are so marked.

Luminaires requiring supply wiring with certain temperature ratings are so marked.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 844, "Luminaires for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Electric Lighting Fixture for Hazardous Locations," "Electric Fixture for Hazardous Locations," "Electric Luminaire for Hazardous Locations" or "Luminaire for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUMINAIRES AND FITTINGS FOR USE IN HAZARDOUS LOCATIONS (IFGZ)

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LUMINAIRES, PAINT SPRAY BOOTH FOR USE IN HAZARDOUS LOCATIONS (IFYJ)**USE AND INSTALLATION**

This category covers incandescent lamp and electric-discharge-lamp-type luminaires intended for flush-mounted installation in the ceiling or wall of a down-draft paint spray booth using liquid coating systems as defined in ANSI/NFPA 33, "Spray Application Using Flammable or Combustible Materials." When the luminaire is limited to a specific mounting location, the luminaire is marked with the intended mounting location, such as "For Wall Mounting Only" or "For Ceiling Mounting Only." When the luminaire is intended for wall and ceiling mounting, the luminaire is not marked with its intended mounting location.

These luminaires have been investigated for deposits of readily combustible paint residues only on the side of the luminaire that forms the interior ceiling or wall surface of the spray booth.

These luminaires have been investigated for Class I, Division 2 areas since they may be located within 3 ft of an opening in the paint spray booth and are so marked.

These luminaires are intended to be installed in uninsulated or insulated single- or double-skin sheet-metal ceilings or walls with all insulation kept a min distance of 3 in. from the sides of the luminaire and not placed over the luminaire such that it would entrap the heat produced by the luminaire.

The minimum spacings between adjacent luminaires, to side walls, to the ceiling above the luminaire, and to the floor below the luminaire are outlined in the installation instructions provided with each luminaire. The space between the flush-mounted luminaire and the adjacent ceiling, floor or walls of the building which are located behind the luminaire must contain relatively unobstructed air space around the luminaire equal to the marked spacings. No allowance has been made for any heat contributed by external heat sources such as steam pipes, heating ducts, and the like.

These luminaires may be accessed for relamping and servicing from either (1) the interior or (2) the exterior of the paint spray booth. If the luminaire is intended to be accessed from the interior of the paint spray booth and is wall mounted, a door or frame interlock switch is provided. This switch is intended to be connected to the control circuit of the spray booth such that if the luminaire door or frame is not closed properly, painting operations cannot be conducted. A ceiling-mounted luminaire that is intended to be accessed from the interior of the spray booth is also provided with a door or frame interlock switch or is marked "Caution — Do Not Operate Paint Spray Booth When Luminaires Frame Are Open. Keep Luminaire Frame Tightly Closed While Paint Spray Booth Is Operating."

Each luminaire is marked with the rated ambient temperature. A luminaire may be marked with two ambient temperatures, indicating that the luminaire has been investigated for a higher ambient on the lens side, for example "Ambient 60 C Front, 25 C Rear." If the marked ambient for the lens side is less than the ambient temperature within the spray booth during the baking mode, the luminaire should be connected to the control circuit of the spray booth such that the luminaire is de-energized during the baking mode. Independent of the marked ambient temperature, installation instructions provided with each luminaire specify the maximum ambient temperature for the luminaire. For example, the luminaire may be marked 25°C ambient and the installation instructions specify maximum installation ambient of 60°C. Consequently, (1) the luminaire is to be de-energized during the baking mode and (2) the maximum ambient temperature within the spray booth during the baking mode is 60°C.

Unless the luminaire is marked "Maximum of ___ No. ___ AWG branch circuit conductors suitable for at least ___ C (___ F) permitted in junction box," no allowance has been made for any heat contributed by branch-circuit conductors which pass through, or supply and pass through, an outlet box or other splice compartment which is part of the luminaire.

Luminaires that include raceways are marked, in combination with the Certification Mark, "Suitable for use as Raceways" and are marked to indicate the maximum number, size and type conductors they intend to accommodate.

Each luminaire is provided with installation and maintenance instructions. The maintenance instructions outline procedures to be followed for lens cleaning and gasket replacement. Cleaning and servicing of the luminaires must be performed only when the interior of the spray booth is nonhazardous and only when the ventilation system is operating.

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 844, "Luminaires for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word

LUMINAIRES AND FITTINGS FOR USE IN HAZARDOUS LOCATIONS (IFGZ)

Luminaires, Paint Spray Booth for Use in Hazardous Locations (IFYJ)—Continued

"LISTED," a control number, and the product name "Paint Spray Booth Lighting Fixture for Hazardous Locations" or "Paint Spray Booth Luminaire for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUMINAIRES, RECESSED TYPE FOR USE IN HAZARDOUS LOCATIONS (IGBW)**USE AND INSTALLATION**

This category covers incandescent lamp and electric-discharge-lamp-type luminaires intended for recessed installation in walls and ceilings of hazardous locations in accordance with the provisions of ANSI/NFPA 70, "National Electrical Code." Unless marked "Suitable for damp locations" or "Suitable for wet locations," recessed luminaires are only suitable for dry locations.

Recessed luminaires are marked with the required minimum temperature rating of wiring supplying the luminaire. Unless marked "maximum of ___ No. ___ AWG branch circuit conductors suitable for at least ___ C (___ F) permitted in junction box," no allowance has been made for any heat contributed by branch-circuit conductors which pass through, or supply and pass through, an outlet box or other splice compartment which is part of the luminaire. The operating temperature is marked on the luminaire if this temperature exceeds 100°C.

Recessed luminaires certified for any of the groups under Class I, Divisions 1 and 2 hazardous locations are designed to operate without causing ignition of surrounding flammable gas or vapor-air atmosphere covered by the group under which it is certified. Seals are provided in luminaires for Class I, Division 1 hazardous locations between lamp chambers and wiring chambers for supply line connections. The luminaires have been tested with respect to maximum external operating temperatures.

Recessed fluorescent luminaires which include raceways are marked, in combination with the Certification Mark, "Suitable for use as Raceways" and are marked to indicate the maximum number, size, and type conductors they are intended to accommodate.

Recessed luminaires suitable for such use may be marked "Suitable for installation in poured concrete" except that recessed luminaires suitable only for installation in poured concrete are marked "For installation only in poured concrete."

Recessed luminaires known to produce temperatures in excess of 90°C at a distance of 1/2 in. from the enclosure walls, and which therefore are only suitable for installation in fire-resistive constructions are marked "This luminaire is suitable for installation only in buildings of fire-resistive construction, where the luminaire is not mounted on or adjacent to combustible material."

Certifications of recessed luminaires for Class I, Division 2 only, of no specific hazardous location groups or of one or more of the hazardous location groups are included below. Such certifications are under hazardous location group headings with the suffix "Division 2 only" or under the heading "Class I, Division 2 only." The luminaire should not be installed in any location where the ignition temperature of the gas of vapor-air mixture which may be present is less than the operating temperature marked on the luminaire.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 844, "Luminaires for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Recessed Type Electric Lighting Fixture for Hazardous Locations," "Recessed Type Electric Fixture for Hazardous Locations," "Recessed Type Electric Luminaire for Hazardous Locations" or "Recessed Type Luminaire for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

LUMINAIRES AND FITTINGS FOR USE IN HAZARDOUS LOCATIONS (IFGZ)

Luminaires, Recessed Type for Use in Hazardous Locations (IGBW)—Continued

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUMINAIRE FITTINGS FOR USE IN HAZARDOUS LOCATIONS (IGIV)
USE

This category covers subassemblies of luminaires intended for final assembly into luminaires in the field. Information or instructions are provided specifying the subassemblies that may be used to assemble a luminaire in the field.

This category also covers conduit boxes and bodies with threaded hubs, adjustable hangers, and flexible luminaire fittings with threaded hubs, for support of luminaires. Information on restrictions in the use of these fittings and as applicable to the assembled luminaire is marked on the fittings or provided with the fittings.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 844, "Luminaires for Use in Hazardous (Classified) Locations," in addition to the hazardous (classified) locations standards referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product, or the Listing Mark on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Fixture Fitting for Hazardous Locations," "Luminaire Fitting for Hazardous Locations," "Electric Lighting Fixture for Hazardous Locations When Completely Assembled With UL Listed Fixture Fittings for Hazardous Locations," "Luminaire for Hazardous Locations When Completely Assembled With UL Listed Luminaire Fittings for Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUMINAIRE FITTINGS FOR USE WITH SPECIFIED FITTINGS FOR USE IN HAZARDOUS LOCATIONS (IGMX)
USE

This category covers luminaire fittings intended for field installation only with specified compatible certified luminaire fittings (see IGIV) to form complete luminaires as identified on the product.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 844, "Luminaires for Use in Hazardous (Classified) Locations."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

+ FITTING FOR HAZARDOUS LOCATIONS
FOR USE WITH LISTED + FITTINGS SPECIFIED
IN MARKINGS IN OR ON THE PRODUCT
Control No.

+ LUMINAIRE or FIXTURE

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

LUMINAIRES AND FITTINGS FOR USE IN HAZARDOUS LOCATIONS (IFGZ)

Luminaire Fittings for Use with Specified Fittings for Use in Hazardous Locations (IGMX)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LIGHTING UNIT FITTINGS, AUXILIARY FOR USE IN HAZARDOUS LOCATIONS (IGOY)
USE AND INSTALLATION

This category covers subassemblies of lighting units, battery packs, charging sections and control devices intended for final assembly into battery-powered auxiliary lighting units in the field.

This unit equipment is intended to provide auxiliary light from included light sources only, when the normal power supply to the equipment is disconnected or otherwise interrupted.

The lighting circuit ratings do not exceed 250 V for tungsten lamps. The investigation of automatic transfer devices includes the determination of their suitability for the auxiliary supply circuit. Information or instructions are provided specifying the subassemblies that may be used to assemble an auxiliary lighting unit in the field.

The unit equipment has not been investigated to determine its conformity with Article 700 of ANSI/NFPA 70, "National Electrical Code," covering emergency lighting.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 844, "Electric Lighting Fixtures for Use in Hazardous (Classified) Locations," in addition to applicable sections of ANSI/UL 924, "Emergency Lighting and Power Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Auxiliary Lighting Unit Fitting for Use in Hazardous Locations," "Auxiliary Lighting Unit When Completely Assembled with UL Listed Luminaire (or Fixture) Fittings for Hazardous Locations" or "Auxiliary Lighting Unit When Completely Assembled with UL Listed Auxiliary Lighting Unit Fittings for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUMINAIRES, MARINE (IGQY)

GENERAL

This category covers marine-type electric luminaires designed for use on marine vessels in accordance with the Electrical Engineering Regulations of the United States Coast Guard, No. CG-259. This category includes luminaires of the recessed and nonrecessed types for use on shipboard. This category does not cover luminaires for use in hazardous (classified) locations as defined in ANSI/NFPA 70, "National Electrical Code."

LUMINAIRE TYPES

The Electrical Engineering Regulations of the United States Coast Guard classify luminaires as "Inside Type," "Inside Drip-Proof Type" or "Outside Type."

An "Inside Type" luminaire is intended for use in dry locations, which are deemed to be passenger's and crew's quarters, radio room, gyro room, chart room, pantries, passageways adjacent to quarters, and public washrooms and toilets which are not equipped with baths or showers.

An "Inside Drip-proof Type" luminaire is intended for use in damp or wet locations which are deemed to be locations exposed to the weather on vessels operating in fresh water, machinery spaces, cargo spaces, refrigerated spaces, gallery, laundry, public washrooms or toilets equipped with baths or showers, and areas which are directly inside of access doors to a weather deck and exposed to the entrance of rain or spray.

An "Outside Type (fresh water)" luminaire is intended for use in severely damp or wet locations such as on the weather deck, or directly inside of access doors to a weather deck and exposed to the entrance of rain or spray, on vessels operating in fresh water.

An "Outside Type (salt water)" luminaire is intended for use in corrosive locations, which are deemed to be locations exposed to weather on vessels operating in salt water.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUMINAIRES, UNDERWATER, MARINE (IHQM)

USE AND INSTALLATION

This category covers luminaires intended for underwater use on marine vessels.

These underwater luminaires are intended for installation and operation in accordance with the manufacturer's instructions and the applicable requirements of the United States Coast Guard, the American Boat and Yacht Council (ABYC), and the National Fire Protection Association (NFPA). Some luminaires consist entirely of a through-hull assembly with provisions for permanent connection to the vessel electrical system. Other luminaires consist of a through-hull assembly and a remote electrical assembly that has provision for permanent connection to the vessel electrical system. For luminaires with remote electrical assemblies, the two assemblies are factory interconnected with a length of cable, flexible cord, or flexible conduit, or the two assemblies have provision for field interconnection with a permanent wiring system.

The luminaire installation instructions identify the maximum incline angle of the hull away from vertical in which the through-hull assembly is intended to be installed.

The installation instructions identify the hull and backing block materials, and range of thickness, for which the through-hull assembly is intended to be suitable.

The installation instructions describe the intended mounting method, including the number, type, and location of all fasteners for each type of hull material and thickness for which the through-hull assembly is identified as suitable.

The installation instructions identify the recommended hull-surface treatment. Where a hull-surface coating or addition of a hull-to-through-hull-assembly water-seal-forming material is required and not included with the through-hull assembly, the installation instructions identify the materials to be used and the specific locations for application.

PRODUCT TYPES

Inside Drip-proof-type Through-hull Underwater Luminaire — A through-hull underwater luminaire for use where the nonimmersed portion of the luminaire is suitable for exposure to dripping oil or water.

Inside-type Through-hull Underwater Luminaire — A through-hull underwater luminaire suitable for use only where the nonimmersed portion of the luminaire is in a dry location.

Outside-type Through-hull Underwater Luminaire — A through-hull underwater luminaire suitable for use where the nonimmersed portion of the luminaire is outside or other wet location involving water exposure more severe than dripping water.

Recessed Luminaires — Where either of the through-hull assembly or any remote electrical enclosure is intended for passing through, or located wholly or partially in, an air- or insulation-filled space between the inside surface of the vessel hull and a supplemental vessel compartment wall located in front of the hull surface, the term "Recessed" is added to the type designation, preceding the other terms. The installation instructions identify which part, the through-hull assembly and any remote electric enclosure, is intended for recessed installation.

PRODUCT MARKINGS

The through-hull assembly of a luminaire without a remote electrical assembly, or the remote electrical of an assembly, where provided, is marked with the voltage rating, ac or dc, and amperes or watts. Polarity identification is provided for all ac-rated luminaires and, where necessary for operation, dc-rated luminaires.

Each through-hull assembly and any remote electrical assembly is marked as an inside type, inside drip-proof type, or outside-type through-hull underwater luminaire. Where applicable as specified under **PRODUCT TYPES**, the term "Recessed" is added to the type designation, preceding the other terms.

The through-hull assembly of a luminaire without a remote electrical assembly, and the remote electrical assembly where part of the luminaire, is marked "Ignition Protected" if found to comply with the ignition-protection requirements. Each through-hull assembly and any remote electrical assembly that does not comply with the ignition-protection requirements is marked, where visible from within the marine vessel after installation, with the word "DANGER," and the following or equivalent: "Possible ignition source. Install outside area requiring ignition protection."

A luminaire not complying with the Vibration Test in UL 1121, "Marine Through-Hull Fittings and Sea-Valves," is marked "For use only on vessels with length exceeding 65 ft (19.8 m)," with length value and associated unit symbol appearing in parentheses.

RELATED PRODUCTS

Luminaires, Underwater, Marine (IHQM)—Continued

General utilitarian-type electric luminaires intended for deck and bulk-head mounting on marine vessels are covered under Luminaires, Miscellaneous, Marine (IGZR).

Cargo lights, floodlights, searchlights, and ordinary luminaires intended for use on any vessel are covered under Luminaires, Nonrecessed, Marine (IHU).

ADDITIONAL INFORMATION

For additional information, see Luminaires, Marine (IGQY), Marine Products (AAMP) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are: ANSI/UL 676, "Underwater Luminaires and Submersible Junction Boxes"

ANSI/UL 1598, "Luminaires"

ANSI/UL 1598A, "Supplemental Requirements for Luminaires for Installation on Marine Vessels"

ANSI/NFPA 302, "Fire Protection Standard for Pleasure and Commercial Motor Craft"

ABYC E-11, "AC & DC Electrical Systems on Boats"

Products marked "Ignition Protected" have additionally been investigated to UL 1500, "Ignition-Protection Test for Marine Products."

UL MARK

The Marine Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Marine Listing Mark for these products includes the UL symbol with the word "MARINE" above the UL symbol (as illustrated in the Introduction of this Directory), the word "LISTED," a control number, and one of the following product names:

"Inside Drip-proof-type Through-hull Underwater Luminaire"

"Inside-type Through-hull Underwater Luminaire"

"Outside-type Through-hull Underwater Luminaire"

"Recessed Inside Drip-proof-type Through-hull Underwater Luminaire"

"Recessed Inside-type Through-hull Underwater Luminaire"

"Recessed Outside-type Through-hull Underwater Luminaire"

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LUMINAIRES AND FITTINGS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (IHRV)

LUMINAIRE FITTINGS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (IHSN)

USE

This category covers subassemblies of luminaires intended for final assembly into luminaires in the field. Information or instructions are provided specifying the subassemblies that may be used to assemble a luminaire in the field.

Also included are conduit boxes and bodies with threaded hubs, adjustable hangers, and flexible luminaire fittings with threaded hubs, for support of luminaires. Information on restrictions in the use of these fittings and as applicable to the assembled luminaire is marked on the fittings or provided with the fittings.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 1598, "Luminaires."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product, or the Listing Mark on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control num-

LUMINAIRES AND FITTINGS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (IHRV)

Luminaire Fittings for Use in Zone Classified Hazardous Locations (IHSN)–Continued

ber, and one of the following product names as appropriate: “Fixture Fitting for Hazardous Locations,” “Luminaire Fitting for Hazardous Locations,” “Electric Lighting Fixture for Hazardous Locations When Completely Assembled With UL Listed Fixture Fittings for Hazardous Locations” or “Luminaire for Hazardous Locations When Completely Assembled With UL Listed Luminaire Fittings for Hazardous Locations.”

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LUMINAIRES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (IHVF)

USE

This category covers incandescent lamp, fluorescent lamp, high-intensity-discharge lamp or surgical-type luminaires.

Luminaires without guards should be used only where not subject to breakage.

Luminaires suitable for wet locations are so marked.

Luminaires marked “Suitable for use in suspended ceilings,” in combination with the Certification Mark, are intended to be mounted in openings of a suspended ceiling. They are marked with the minimum spacings between adjacent luminaires to side walls and to the structural ceiling above the luminaires. The space between the suspended ceiling and the structural ceiling must contain relatively unobstructed air space around the luminaires equal to the marked spacings. Fluorescent-lamp-type luminaires are suitable for end-to-end mounting. The test conditions do not anticipate external heat sources in the ceiling area such as steam pipes, heating ducts, and the like.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 1598, “Luminaires.”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Lighting Fixture for Hazardous Locations” or “Luminaire for Hazardous Locations.”

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LUMINAIRES AND FITTINGS FOR USE IN HAZARDOUS LOCATIONS CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (IHUK)

LUMINAIRE FITTINGS FOR USE IN HAZARDOUS LOCATIONS CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (IHVP)

USE

This category covers subassemblies of luminaires intended for final assembly into luminaires in the field. Information or instructions are provided specifying the subassemblies that may be used to assemble a luminaire in the field.

Also included are conduit boxes and bodies with threaded hubs, adjustable hangers, and flexible luminaire fittings with threaded hubs, for sup-

LUMINAIRES AND FITTINGS FOR USE IN HAZARDOUS LOCATIONS CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (IHUK)

Luminaire Fittings for Use in Hazardous Locations Classified in Accordance with IEC Publications (IHVP)–Continued

port of luminaires. Information on restrictions in the use of these fittings and as applicable to the assembled luminaire is marked on the fittings or provided with the fittings.

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is IEC 60079-15, “Electrical apparatus for explosive gas atmospheres, Part 15: Electrical apparatus with type of protection ‘n.’”

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol with the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory).

For those products which are also Listed, the Classification Mark includes the appropriate Listing Mark and the statement: “ALSO CLASSIFIED BY UNDERWRITERS LABORATORIES INC. IN ACCORDANCE WITH IEC 60079-15.”

For those products which are not also Listed, the Classification Mark includes the statement: “IN ACCORDANCE WITH IEC 60079-15” and a control number.

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FLASHLIGHTS AND LANTERNS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (IJRF)

USE

This category covers flashlights and lanterns for use in any of the groups under Class I, Zone classified hazardous locations. They have been investigated with respect to use in the presence of specific flammable gas or vapor-air atmospheres. The tests have been conducted using specific lamp and battery combinations. The lamp designation and the number, type, size and voltage of the batteries to be used are marked on the product.

Safety of operation in the presence of explosive mixtures may be endangered if replacement parts other than those specified on the product are used.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Flashlight for Use in Hazardous Locations” or “Lantern for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

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FLASHLIGHTS AND LANTERNS FOR USE IN HAZARDOUS LOCATIONS (IKBR)

GENERAL

This category covers battery-powered flashlights and lanterns. They have been investigated using the specific lamp and battery combinations specified by the manufacturer. The lamp designation and the number, type, size and voltage of the batteries intended to be used is marked on the product.

PRODUCT CATEGORIES BY CATEGORY CODE

200 FLASHLIGHTS AND LANTERNS FOR USE IN HAZARDOUS LOCATIONS (IKBR)

Flashlights and lanterns that utilize incandescent lamps are provided with a filament-disconnect mechanism or other type of construction to protect against ignition of the specified hazardous atmosphere. The filament-disconnect mechanism is intended to disconnect the lamp bulb from the circuit when the glass bulb or envelope surrounding the lamp filament is broken.

Intrinsically safe flashlights and lanterns are so marked on the device. The safety of operation in the presence of explosive mixtures may be compromised if replacement parts other than those specified on the product are used.

Flashlights and lanterns are not intended for use in hospital operating rooms unless so marked on the device.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 783, "Electric Flashlights and Lanterns for Use in Hazardous (Classified) Locations," or ANSI/UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flashlight for Use in Hazardous Locations" or "Lantern for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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FLAT CONDUCTOR CABLE, TYPE FCC (IKKT)

GENERAL

This category covers flat conductor cable, Type FCC, which is an assembly of three or more solid, flat, parallel, insulated copper conductors. The cable is intended for installation in accordance with Article 324 of ANSI/NFPA 70, "National Electrical Code." The cable is marked for use with specific fittings [see Flat Conductor Cable Fittings (IKMW)] to make up a particular flat conductor cable, Type FCC, wiring system.

The cable is marked on both sides with the manufacturer's identification, wire size in AWG, Type FCC, 300 V, temperature rating and ampacity. Type FCC cable always has one conductor identified as the grounding conductor and one conductor identified as the grounded conductor. The identification means shall be printing or striping the conductor green (grounding) or white (grounded).

Installation instructions are supplied by the manufacturer for use by the general contractor, erector, electrical contractor, electrical inspector and others concerned with the installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flat Conductor Cable, Type FCC."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FLAT CONDUCTOR CABLE FITTINGS (IKMW)

USE AND INSTALLATION

This category covers flat conductor cable fittings, which include all those items needed to install flat conductor cable, Type FCC (see IKKT) in accordance with Article 324 of ANSI/NFPA 70, "National Electrical Code." This category includes top and bottom shields, connectors, transition assemblies and insulators.

FLAT CONDUCTOR CABLE FITTINGS (IKMW)

A fitting is suitable for use with a specific Type FCC cable in a particular flat conductor cable wiring system and is so identified.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, electrical inspector and others concerned with the installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 498, "Attachment Plugs and Receptacles," and ANSI/UL 486A-486B, "Wire Connectors."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flat Conductor Cable Fitting."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

GARMENT-FINISHING APPLIANCES (IKOZ)

GENERAL

This category covers household and commercial garment-finishing appliances. Garment-finishing appliances may be of the automatic or nonautomatic type.

Most products covered under this category are limited to use on alternating current; this limitation is marked on the nameplate.

Garment-finishing appliances incorporating rotary-type devices are required to employ a readily operable safety-release mechanism, which is independent of the connection of the machine to the electrical power supply.

Some garment-finishing appliances use steam and/or air for the purpose of forming and/or removing wrinkles from garments. The steam may be supplied by electric steam generators integral with the appliance or from an external steam source.

This category also covers devices provided with mechanical and/or air-inflatable forms to form garments during the steaming operation.

Motors used in permanently connected equipment and intended for continuous-duty operation are prevented from hazardous overheating by thermal protectors, overcurrent protective devices, or inherent impedance.

RELATED PRODUCTS

Electric irons are covered under Electric Irons (NBEZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 141, "Garment Finishing Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the appropriate product name as shown in the individual Listings.

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FLEXIBLE LIGHTING PRODUCTS (ILGJ)

USE

This category covers flexible lighting products intended for decorative use, consisting of nonreplaceable lamps connected in series/parallel strings and enclosed within a flexible polymeric tube or extrusion.

Flexible lighting products are provided with an attachment plug for connection to a nominal 120 V, 15 or 20 A branch circuit. Flexible lighting products may be battery operated or provided with a Class 2 power supply. These lights do not have provisions for permanent mounting to a building or structure and should not be installed in a manner that can cut or damage the outer insulation. They are intended to only be connected as a complete unit and not field cut unless the flexible lighting products are in the secondary of a Class 2 circuit.

These flexible lighting products have not been investigated for use within another enclosure.

This category also covers flexible light sculptures, which are intended for decorative use and consist of a polymeric or rigid frame to which a flexible lighting product is attached. The flexible lighting product attached to the light sculpture provides outline lighting of the figure or object created by the frame. Flexible lighting sculptures whose primary purpose is to be a sign (not decorative) are not covered under this category.

Flexible lighting products are intended for indoor use unless marked for outdoor use.

RELATED PRODUCTS

Electric signs are covered under Signs (UXYT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2388, "Flexible Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flexible Light" or "Flexible Light Sculpture."

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FLEXIBLE METALLIC TUBING (ILJW)

GENERAL

This category covers flexible metallic tubing in trade sizes 3/8, 1/2 and 3/4 (metric designators 12, 16 and 21) for installation in accordance with Article 360 of ANSI/NFPA 70, "National Electrical Code." This tubing is intended for installation and use in accordance with the following information.

Flexible metallic tubing is intended for installation where not subject to physical damage such as above suspended ceilings.

Flexible metallic tubing is permitted to be used in lengths of six ft or less, in dry locations, in accessible locations when protected from physical damage or concealed, to contain branch-circuit conductors at a maximum potential of 1000 V and when terminated in suitable fittings.

Flexible metallic tubing should not be used underground for direct earth burial or in duct which is buried, or embedded in poured concrete or aggregate or in direct contact with the earth or where subjected to corrosive conditions or in direct contact with masonry or in damp locations. Flexible metallic tubing containing circuit conductors protected by overcurrent devices rated 20 A or less is suitable as a grounding means.

RELATED PRODUCTS

See Fittings, Flexible Metallic Tubing (ILNR) with respect to fittings suitable as a grounding means.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1652, "Outline of Investigation for Flexible Metallic Tubing."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flexible Metallic Tubing."

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FITTINGS, FLEXIBLE METALLIC TUBING (ILNR)

GENERAL

This category covers flexible-metallic-tubing fittings in trade sizes 3/8, 1/2 and 3/4 (metric designators 12, 16 and 21). This tubing is intended for installation and use in accordance with the following information and the limitations specified in Flexible Metallic Tubing (ILJW).

All male threaded fittings have only been investigated for use with locknuts.

Grounding — These fittings are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with ANSI/NFPA 70, "National Electrical Code." The conduit used with the connectors should contain conductors protected by overcurrent devices rated 20 A or less.

Reusability — Fittings have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction.

PRODUCT MARKINGS

Fittings have been tested for use only with steel tubing unless marked on the device or carton to indicate suitability for use with aluminum or other material.

ADDITIONAL INFORMATION

For additional information, see Flexible Metallic Tubing (ILJW) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flexible Metallic Tubing Fitting," "Connector" or "Coupling," or other appropriate product name as shown in the individual Listings.

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FLEXIBLE STAGE AND LIGHTING POWER CABLE (ILPH)

USE AND INSTALLATION

This category covers flexible stage and lighting power cable constructed for use in accordance with Article 400 of ANSI/NFPA 70, "National Electrical Code" (NEC). Flexible stage and lighting cable consists of either a single insulated conductor or two or more insulated conductors, with or without fully insulated equipment grounding conductors, with an overall jacket.

RATINGS

The cable is rated 600 V, 60°C, 75°C, 90°C or 105°C. The cable is intended for use at ampacities in accordance with Table 400.5(B) of the NEC. Cable rated 105°C has the same ampacities assigned to 90°C rated cable in Table 400.5(B) and is so marked.

Flexible stage and lighting power cable employs flexible stranded copper conductors in a size range of 8 AWG to 250 kcmil and is designated as Type SC (thermoset insulation and jacket), Type SCT (thermoplastic insulation and jacket) and Type SCE (thermoplastic elastomer insulation and jacket).

PRODUCT MARKINGS

Cable marked "Oil Resistant 60C" is suitable for exposure to oil at 60°C. Cable marked "Oil Resistant 75C" is suitable for exposure to oil at 75°C.

202 FLEXIBLE STAGE AND LIGHTING POWER CABLE (ILPH)

Cable marked "water resistant" is suitable for immersion in water. This cable may be marked "-40C." If so marked, the cable complies with a bend test (not a suppleness test) at -40°C. Cable marked "-50C," "-60C" or "-70C" complies with a bend test (not a suppleness test) at -50°C, -60°C or -70°C, as applicable.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1680, "Outline of Investigation for Stage and Lighting Cables."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flexible Stage and Lighting Power Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FLOOR CLEANERS FOR USE IN HAZARDOUS LOCATIONS (ILQV)

GENERAL

This category covers floor cleaners consisting of an aqueous solution of detergents and certain other materials. These cleaners have been certified as to use on electrically conductive floorings certified by UL.

The use of these floor cleaners on certified floorings does not adversely affect their electrical conductivity or their ability to dissipate electrostatic charges on persons and conductive equipment electrically contacting them.

These floor cleaners are free from any tendency to heat spontaneously under use conditions.

The manufacturer's instructions for use of these floor cleaners should be followed.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 779, "Electrically Conductive Floorings."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[TRADE NAME]

AS TO ELECTRICAL CONDUCTIVITY AND SPONTANEOUS HEATING WHEN USED ON CONDUCTIVE FLOORS FOR USE WITH LISTED ELECTRICALLY CONDUCTIVE FLOORING OF THE * TYPE

Control No.

* Type of flooring, such as vinyl and/or linoleum

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FLOORING, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (INFZ)

USE

This category covers electrically conductive floorings intended for use in industrial plants, arsenals, hospital operating rooms, and similar locations where it is necessary to reduce the risk of accumulation of static electricity.

Tests indicate that these floorings, when installed and maintained in accordance with the manufacturer's instructions, are moderately electrically con-

FLOORING, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (INFZ)

ductive and dissipate electrostatic charges on persons and conductive equipment making electrical contact with the floorings, and that the electrical resistance conforms to ANSI/NFPA 99, "Health Care Facilities Code."

Conductive footwear on personnel, and conductive equipment fitted with conductive bases, leg tips, or casters making electrical contact with the flooring are required in order to make conductivity of the flooring effective in equalizing electrostatic charges. A grounding connection to the flooring may be provided.

To dissipate static electrical charges that may be present on persons or movable equipment before entering the hazardous area, these floorings should extend into rooms and corridors immediately serving or communicating with the hazardous area.

Insulating floor waxes should not be used on these floorings.

When flammable solvents or adhesives are used during application of the flooring, precaution should be taken to obtain adequate ventilation and to avoid sources of ignition.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 779, "Electrically Conductive Floorings."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrically Conductive Flooring Relating to Hazardous Locations," "Electrically Conductive Floor Material Relating to Hazardous Locations" or "Floor Tile Relating to Hazardous Locations."

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FLOORING, STATIC DISSIPATIVE, RELATING TO HAZARDOUS LOCATIONS (INTX)

USE

This category covers static dissipative flooring intended for use where it is necessary to reduce the risk of accumulation of static electricity.

Tests indicate that these floorings, when installed and maintained in accordance with the manufacturer's instructions, dissipate electrostatic charges, and the surface resistivity conforms to the requirements of Department of Defense Military Handbook No. 263B, "Electrostatic Discharge Control Handbook for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)."

Insulating floor waxes should not be used on these floorings.

When flammable solvents or adhesives are used during application of the flooring, precaution should be taken to obtain adequate ventilation and to avoid sources of ignition.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic document used to investigate products in this category is Department of Defense Military Handbook No. 263B (MIL-HDBK-263B), "Electrostatic Discharge Control Handbook for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)" (July 31, 1994).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**STATIC DISSIPATIVE FLOORING
DOD MIL-HDBK-263B
SEE INSTRUCTIONS**

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FOOD-PREPARING MACHINES (IPNX)

FOOD-PREPARING MACHINES, COMMERCIAL (IPST)

USE AND INSTALLATION

This category covers electrically operated machines intended for use in commercial kitchens associated with restaurants, hospitals or other business establishments where they are not ordinarily accessible to the general public. They are used in the processing or combination processing and serving of foods and food products and may be provided with such miscellaneous attachments as bowls, sieves, droppers, etc., not involving moving or cutting parts. Attachments that perform functions other than intended by the basic design have not been investigated unless specifically noted in the individual certifications and covered in the installation and use instructions.

In general, the intended application of the product is such as to render the product inappropriate for household use, unless the product has also been certified under Food-preparing Machines, Household (IPWZ).

Commercial food-preparing machines such as meat- and bread-slicing machines, choppers, meat saws, etc., employing knives, screw- or worm-type feeding mechanisms, etc., are investigated for risk of personal injury, electric shock and fire. These machines are required to employ, in varying degrees, guards, safety releases, interlocks, markings, etc., to reduce the risk of accidents. In determining the need for protection against the risk of personal injury, consideration is given to the required utility of the product in a commercial application and the fact that experienced operators will most likely use the product.

Some products in this category have cutting or moving parts, presenting certain risks of personal injury that cannot be wholly eliminated by practical design features; such risks have been reduced to an acceptable degree. If a product is suitable for built-in installation, side-by-side mounting or stacking, it is so indicated in the installation instructions.

If a product is of a type designed for permanent connection to water supply or waste disposal lines at the point of installation, Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection.

Some equipment may be designed to accept accessories in the field. In such cases, both the commercial food-preparing machine and the accessory (attachment) are marked to relate the two for proper installation.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of ANSI/NFPA 70, "National Electrical Code," must be observed in installation or use, warnings or special instructions are on the equipment visible after installation and during use where applicable.

REBUILT PRODUCTS

This category also covers commercial motor-operated food-preparing machines that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt commercial motor-operated food-preparing machines are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt commercial motor-operated food-preparing machines are subject to the same requirements as new commercial motor-operated food-preparing machines.

FACTORS NOT INVESTIGATED

The sanitation of these products has not been investigated. See Commercial Powered Food Preparation Equipment, Sanitation (DUIA) for more information.

RELATED PRODUCTS

Accessories intended for use with commercial food-preparing machines are covered under Food-preparing Machine Accessories, Commercial (IPUW).

Refrigerated beverage and/or ice dispensers are covered under Beverage Coolers and Beverage Cooler-Dispensers (SFWY).

Refrigerated ice cream makers are covered under Ice Cream Makers (SINX).

Custom-built food-preparation or serving equipment consisting of drop-in components, shelf heaters, plate warmers or heated food displays, etc., is covered under Commercial Cooking Appliances (KNGT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 763, "Motor-Operated Commercial Food Preparing Machines."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up

Food-preparing Machines, Commercial (IPST)—Continued

Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Food-preparing Machine" or "Meat Slicer," or other appropriate product name as shown in the individual Listings.

For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Food-preparing Machine Accessories, Commercial (IPUW)

USE

This category covers accessories intended for use with commercial food-preparing machines.

FACTORS NOT INVESTIGATED

The sanitation of these products has not been investigated. See Commercial Powered Food Preparation Equipment, Sanitation (DUIA) for more information.

ADDITIONAL INFORMATION

For additional information, see Food-preparing Machines, Commercial (IPST) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 763, "Motor-Operated Commercial Food Preparing Machines."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY]

FOR USE WITH LISTED

[COMPANY NAME, MODEL OF FOOD-PREPARING MACHINE] ONLY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FUEL CELL EQUIPMENT (IRGN)

USE AND INSTALLATION

This category covers fuel cell type power systems with input/output rated 600 V or less and intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code." These products are marked for indoor or outdoor use. Authorities Having Jurisdiction should be consulted regarding the use of this equipment before installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

FUEL CELL POWER SYSTEMS FOR USE IN INDUSTRIAL TRUCKS (IRGQ)

USE AND INSTALLATION

This category covers fuel cell power systems intended to be installed in Type CGH industrial trucks used in locations as defined in ANSI/NFPA 505, "Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations," and ANSI/NFPA 70, "National Electrical Code."

These fuel cell power systems are self-contained (that is, a complete system incorporated into its own housing that is intended to replace or be combined with a battery system to power an industrial truck).

These systems are intended for use in equipment as described in ANSI/UL 583, "Electric-Battery-Powered Industrial Trucks."

These systems have a storage pressure rating of either 25 MPa or 35 MPa and are fueled with gaseous hydrogen using on-board refueling, as these systems incorporate hydrogen storage that is not removable for refueling purposes.

Fuel Cell Power Systems for Use in Industrial Trucks (IRGQ)—Continued

This category does not cover fuel cell power systems intended for use in on-road vehicles.

PRODUCT MARKINGS

These systems are marked to indicate the manufacturer's name, model number, type of fuel required including service pressure and maximum operating pressure, output electrical ratings, rated ambient temperature range, weight of the fuel cell system, and center of gravity of the fuel cell power system.

These systems are also marked with the effective end-of-service date for the hydrogen pressure vessel in a location where it will be visible after installation of the fuel cell system in the industrial truck end application.

Products intended to be used in locations with elevated wind speeds are marked with the maximum wind speed in mph. Products investigated for a minimum IP rating may be marked with that IP rating.

RELATED PRODUCTS

Stationary fuel cell systems are covered under Stationary Fuel Cell Systems (IRGZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2267, "Fuel Cell Power Systems for Installation in Industrial Electric Trucks."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fuel Cell Power System for Use in Industrial Trucks."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HAND-HELD OR HAND-TRANSPORTABLE FUEL CELL POWER UNITS AND DISPOSABLE FUEL CARTRIDGES (IRGU)

USE AND INSTALLATION

This category covers hand-held or hand-transportable direct methanol fuel cell power systems intended to provide a dc electrical power source not exceeding 60 V ac and 240 VA, and accessory removable methanol fuel cartridges with a fuel capacity not exceeding 950 mL.

This category also covers hand-held or hand-transportable alkaline (direct borohydride) fuel cell power systems intended to provide a dc electrical power source not exceeding 60 V ac and 240 VA, and accessory single-use borohydride fuel cartridges with a liquid fuel capacity not exceeding 1 L.

Removable methanol fuel cartridges transporting hazardous fuels for use with the direct methanol fuel cell systems are intended to comply with the requirements of the U.S. Department of Transportation (DOT) in accordance with 49CFR172, "Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements."

PRODUCT MARKINGS Direct Methanol Systems

Direct methanol fuel cell power systems are marked with the manufacturer's name, model designation and fuel type. These products are also marked with the following (or equivalent wording): "WARNING: This Product Contains Methanol, Which is an Eye, Skin, and Respiratory Tract Irritant. Methanol May Cause Blindness or Death if Swallowed. If Methanol is Exposed, Contain and Dispose of Methanol. Use in Well-Ventilated Areas. Read and Understand All Instructions Before Use. Keep Out of Reach of Children."

Fuel cell power systems found to provide limited power output in accordance with UL Subject 2265A, "Outline of Investigation for Hand-Held or Hand-Transportable Fuel Cell Power Units with Disposable Methanol Fuel Cartridges for Use in Original Equipment Manufacturer's Information Technology Equipment," are additionally marked "Limited Power Supply" (or "LPS").

Removable fuel cartridges are marked with the manufacturer's name, model number, type of fuel, and the statement "For Use with _____ Model _____ Fuel Cell Power System" (or equivalent).

Removable fuel cartridges are also marked with the following (or equivalent wording): "WARNING: This Product Contains Methanol, Which is an Eye, Skin, and Respiratory Tract Irritant. Methanol May Cause Blindness or

Hand-held or Hand-transportable Fuel Cell Power Units and Disposable Fuel Cartridges (IRGU)—Continued

Death if Swallowed. If Methanol is Exposed, Contain and Dispose of Methanol. Keep Out of Reach of Children. Never Expose to Heat Above 140°F (60°C) or to Prolonged Sunlight. Never Puncture or Put in Fire. Do Not Crush, Disassemble or Mutilate. Read and Understand All Instructions Before Use."

Fuel cartridges for hand-held or hand-transportable fuel are marked with appropriate identifying information for products containing methanol, as outlined in 49CFR106, "Rulemaking Procedures."

Alkaline (Direct Borohydride) Systems

A borohydride fuel cartridge and single-use alkaline system is marked with the following (or equivalent wording): "WARNING: Contents are Corrosive and Toxic. Do Not Disassemble. Avoid Contact with Contents. Do Not Expose to Flame or Heat Above 50°C (122°F). Do Not Expose to Acids, Oxidizers, Alcohol or Household Cleaning Products. Follow Usage Instructions. In the Case of Contact with Contents, Seek Medical Attention."

Fuel cell power systems found to provide limited power output in accordance with UL Subject 2265C, "Outline of Investigation for Hand-Held or Hand-Transportable Alkaline (Direct Borohydride) Fuel Cell Power Units and Borohydride Fuel Cartridges for Use with Consumer Electronics or Information Technology Equipment," may additionally be marked "Limited Power Supply" (or "LPS").

Fuel cell power systems and fuel cartridges are marked with the manufacturer's name, model number, fuel composition and amount of fuel. Fuel cell systems are additionally marked with their electrical output ratings.

RELATED PRODUCTS

Component fuel cell modules intended for use in a portable application, but not intended for use with hand-held or hand-transportable equipment are covered under Fuel Cell Modules (IRGR2).

ADDITIONAL INFORMATION

For additional information, see Fuel Cell Equipment (IRGN) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate direct methanol systems in this category are contained in UL Subject 2265A, "Outline of Investigation for Hand-Held or Hand-Transportable Fuel Cell Power Units with Disposable Methanol Fuel Cartridges for Use in Original Equipment Manufacturer's Information Technology Equipment."

The basic requirements used to investigate alkaline (direct borohydride) systems in this category are contained in UL Subject 2265C, "Outline of Investigation for Hand-Held or Hand-Transportable Alkaline (Direct Borohydride) Fuel Cell Power Units and Borohydride Fuel Cartridges for Use with Consumer Electronics or Information Technology Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Direct Methanol Fuel Cell Power Unit" (or "DM Fuel Cell Power Unit") or "Methanol Fuel Cartridge" for methanol systems, or "Alkaline Fuel Cell Power Unit," "Direct Borohydride Fuel Cell Power Unit" or "Borohydride Fuel Cartridge" for alkaline fuel cell systems, or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PORTABLE FUEL CELL POWER SYSTEMS (IRGY)

USE AND INSTALLATION

This category covers portable fuel cell power systems intended for use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). These products have an input/output rating of 600 V or less, and are intended for use as marked with the appropriate fuel. These products are intended as a portable source of supply in accordance with the manufacturer's instructions.

These products may be restricted to use within controlled environments, which are environments that are heated, indoor locations, such as computer rooms, offices or factory floors, that are relatively free of conductive contaminants, such as carbon dust and the like. Portable fuel cell power systems restricted to this use are marked as noted under **PRODUCT MARKINGS** below.

This category also covers fuel cell systems used as a source of auxiliary power (not for motive power) within recreational vehicles in accordance with Article 551 of the NEC, to be installed in accordance with the manufacturer's instructions.

Portable Fuel Cell Power Systems (IRGY)—Continued

This category does not cover the replaceable or refillable fuel cartridges that are used to fuel the portable fuel cell systems or fuel cells systems used as an auxiliary power source in recreational vehicles.

PRODUCT MARKINGS

These products are marked to indicate the manufacturer's name, model number, serial number, type of fuel required and minimum and maximum gas supply pressure if using gaseous fuels, fuel consumption at rated electrical output, minimum operating hours at full load per one tank of fuel, input and output electrical ratings, output power factor if less than unity unless marked in both W and VA or W and A, and rated ambient temperature range.

Products intended for use in controlled environments are marked "CAUTION: For Use in Controlled Environments. Refer to Manual for Environmental Conditions."

Products intended for indoor use only are marked "WARNING: For Indoor Use Only."

Products intended for outdoor use only are marked "WARNING: For Outdoor Use Only."

RELATED PRODUCTS

Stationary fuel cell power systems are covered under Stationary Fuel Cell Power Systems (IRGZ).

Fuel cell systems intended for use in industrial trucks are covered under Fuel Cell Power Systems for Use in Industrial Trucks (IRGQ).

Micro fuel cells and their cartridges are covered under Hand-held or Hand-transportable Fuel Cell Power Units and Disposable Fuel Cartridges (IRGU).

Fuel cell modules are covered under Fuel Cell Modules (IRGR2).

Portable engine generators that employ internal-combustion engines as their source of power are covered under Engine Generators for Portable Use (FTCN).

Engine generators intended for use in recreational vehicles that employ internal-combustion engines as their source of power are covered under Engine Generators for Recreational Vehicles (FTCZ).

ADDITIONAL INFORMATION

For additional information, see Fuel Cell Equipment (IRGN) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/CSA America FC 3, "Portable Fuel Cell Power Systems."

Systems that use methanol as a source of fuel are additionally investigated to the methanol emissions test and fuel gas compatibility test as outlined in UL Subject 2265A, "Outline of Investigation for Hand-Held or Hand-Transportable Fuel Cell Power Units with Disposable Methanol Fuel Cartridges for Use in Original Equipment Manufacturer's Information Technology Equipment"

Systems intended to be installed as auxiliary power sources in recreational vehicles are additionally investigated to the vibration test of ANSI/UL 458, "Power Converters/Inverters and Power Converter/Inverter Systems for Land Vehicles and Marine Crafts."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, the product name "Portable Fuel Cell Power System," and the statement "In Accordance with ANSI/CSA America FC 3-(+)-(++)."

(+) Suffix letter of latest addendum if applicable

(++) Issue year of latest addendum or standard

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

STATIONARY FUEL CELL POWER SYSTEMS (IRGZ)

USE AND INSTALLATION

This category covers stationary fuel cell power systems intended for use in accordance with ANSI/NFPA 70, "National Electrical Code." These products have an input/output rating of 600 V or less, and are intended for use as marked with the appropriate fuel. These products are intended for permanent connection to the source of supply and for installation in accordance with the manufacturer's installation instructions. Products rated more than 50 kW are intended for installation in accordance with Chapters 1 – 8, and products rated 50 kW or less are intended for installation in accordance with Chapter 9 of ANSI/NFPA 853, "Installation of Stationary Fuel Cell Power Systems."

REBUILT PRODUCTS

Stationary Fuel Cell Power Systems (IRGZ)—Continued

This category also covers stationary fuel cell power systems that are rebuilt by the original manufacturer or the original manufacturer's authorized manufacturer also covered under this category. Rebuilt stationary fuel cell power systems are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt stationary fuel cell power systems are subject to the same requirements as new stationary fuel cell power systems, including production-line tests.

ACCESSORIES

Field-installed accessories to certified equipment are provided with suitable markings and/or instructions detailing proper installation or assembly of the accessory with either specific or generic certified equipment specified in the markings or instructions.

PRODUCT MARKINGS

These products are marked to indicate the manufacturer's name, model number, serial number, type of fuel required and required delivery pressure, fuel consumption at rated electrical output, input and output electrical ratings, and rated ambient temperature range.

Products intended for outdoor installation only are marked "For Outdoor Installation Only." Products intended for indoor installation only are marked "For Indoor Installation Only."

RELATED PRODUCTS

This category does not cover any factory- or field-installed integral or interconnected equipment provided, such as an inverter, to change the fuel cell stack output voltage or frequency, or to serve as a utility interactive connection means. Products associated with this equipment for these purposes are covered under Static Inverters and Converters for Use in Independent Power Systems (QIKH).

ADDITIONAL INFORMATION

For additional information, see Fuel Cell Equipment (IRGN), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/CSA America FC 1, "Stationary Fuel Cell Power Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, the product name "Stationary Fuel Cell Power System," and the statement "In Accordance with ANSI/CSA America FC 1-(+)-(++)."

For rebuilt products, the word "Rebuilt," "Refurbished" or "Remanufactured" precedes the product name.

The product name for field-installed accessories includes the word "Accessory."

(+) Suffix letter of latest addendum if applicable

(++) Issue year of latest addendum or standard

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FUEL GAS BOOSTER COMPRESSOR EQUIPMENT (IUXX)

GENERAL

This category covers fuel gas booster compressor equipment designed to increase the pipeline pressure of a fuel gas, such as natural gas, from a low-fuel gas pressure (nominally 1/4 to 5 psig) to a higher outlet pressure (such as 30 to 115 psig). This higher-pressure fuel gas is then supplied to an external product, such as a microturbine. The equipment is intended for either indoor or outdoor use.

The equipment consists of a motor-compressor or an open-type compressor, internal gas piping, wiring and a combination of associated electrical and mechanical assemblies and controls on a common frame in an overall enclosure.

Equipment containing a motor-compressor connected to a flammable fuel gas piping system has been investigated to determine that flame will not propagate beyond the inlet and outlet fuel gas connections of the equipment, should an electrical fault occur within the motor-compressor when a flammable gas/air mixture is present.

These units are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Mechanical Equipment and Associated Products (AAME).

PRODUCT CATEGORIES BY CATEGORY CODE

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 60335-2-34, "Household and Similar Electrical Appliances, Part 2: Particular Requirements for Motor-Compressors," and ANSI/UL 2200, "Stationary Engine Generator Assemblies."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fuel Gas Booster" or "Fuel Gas Booster Compressor."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FURNISHINGS (IYMR)**GENERAL**

This category covers electrical (rated 600 V ac or less) and/or nonelectrical furnishings, and includes:

1. Motor-operated furniture, such as motor-operated beds and chairs, merchandise displays and furniture-mounted video support systems
2. Electrified furniture, such as lighted curio cabinets, microwave carts and bed headboards
3. Nonseasonal electrical decorations, such as wave machines, lava lamps and neon sculptures
4. Home and individual office furnishings, such as study carrels, consoles and desks
5. Commercial product and informational displays, such as shelving units, motorized carpet displays and product platforms
6. Electrified building components, such as windows
7. Other similar miscellaneous furnishings intended for use in dwelling units or commercial environments

USE AND INSTALLATION

Products marked for household or residential use are intended to be used in dwelling units and guest rooms of hotels and motels. Hotel common areas such as the lobby or restaurant are considered commercial. Household or residential furnishings may be used in commercial settings, such as individual offices, where the number of people using the furnishings will be limited.

Products marked for commercial use are used where business is transacted, such as an office building, factory, warehouse, or similar location, and which is not a dwelling unit. These locations are where a large number of different people may be using the furnishings or are near the furnishings (such as customers near a display furnishing).

Products covered under this category are provided with installation and use instructions.

These units are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

UNEVALUATED FACTORS

The physiological or psychological effects on a person, beneficial or otherwise, which may be produced through the use of this equipment either singularly or with any other apparatus have not been investigated.

RELATED PRODUCTS

Office furnishings are covered under Office Furnishings (QAWZ).

Cord-connected multiple-outlet strips intended for general use (e.g., relocatable power taps) are covered under Relocatable Power Taps (XBYS). Cord-connected multiple-outlet strips intended for permanent mounting (e.g., furniture power distribution units) are covered under Furniture Power Distribution Units (IYNO).

Lighted display cases and cabinets used in commercial applications are covered under Wired Cabinets (ZNXR). Nonilluminated advertising displays are covered under Advertising Displays, Nonilluminated (AAVU).

Furnishings used for patient care are covered under Medical Equipment (PIDF).

Custom-built commercial products, such as ticket machines, electronic point-of-sale products, and the like are covered under Custom-built Kiosks (EMHH).

Furnishings intended for support of audio or video equipment and provided with casters or secured to the building structure are covered under Carts and Stands for Household, Commercial and Professional Use (CZUV) or Carts, Tall Institutional (CZWK).

Portable lamps are covered under Luminaires, Portable (QOWZ) or Portable Cabinet Luminaires (QOVJ).

Decorative products intended for seasonal, temporary use such as lighted sculptures, molded figurines, and the like are covered under Outfits, Decorative (DGXW). Decorative lighting strings or electric ornaments intended for seasonal use are covered under Strings, Decorative Lighting (DGZZ) and Electric Ornaments (DGXQ).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BUILDING COMPONENTS (IYMT)**GENERAL**

This category covers building components, such as heated windows, electrochromatic windows, motorized structure-mounted mirrors, and nonmotorized structure-mounted shelving and shelving support systems.

For commercial units that (1) have a surface area greater than 10 sq. ft. and are intended to be adjacent to other furnishings, or (2) are greater than 20 sq. ft. and intended to stand alone, the surface burning characteristics of building materials employed in these assemblies are judged to be no greater than that of ordinary lumber used in on-site construction. Finished surfaces are of materials having a flame spread rating of 200 or less and, unless otherwise marked, a smoke developed rating of 450 or less.

These building components have not been investigated for use as components of fire-resistive assemblies.

These products are provided with installation and use instructions.

These units are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

These products are marked with the Listee's name, trademark or UL File Number, a unique model designation, a date code, and any electrical ratings.

Products intended for use only in dwelling units are marked "Household Use Only"; products intended for use only in commercial settings are marked "Commercial Use Only." If there is no marking, then the product may be used in both dwelling units and commercial settings.

Products suitable for outdoor use are marked "Suitable for Outdoor Use."

ADDITIONAL INFORMATION

For additional information, see Furnishings (IYMR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 962, "Household and Commercial Furnishings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Building Component," "Heated Glazing," "Electrified Glazing," "Shelving System" or "Articulating Mirror."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMMERCIAL DISPLAYS (IYMX)**USE AND INSTALLATION**

This category covers commercial merchandise displays, such as lighted and powered shelving units, luminary store displays, motorized rotating merchandise displays and motorized carpet flooring displays. A commercial display is a furnishing other than a showcase or cabinet that is used in a commercial establishment to display jewelry or similar merchandise.

Commercial merchandise displays may be permanently connected or may be cord-and-plug connected with up to two power-supply cords.

For commercial units that (1) have a surface area greater than 10 sq. ft. and are intended to be adjacent to other furnishings, or (2) units that are greater than 20 sq. ft. and intended to stand alone, the surface burning characteristics of building materials employed in these assemblies are judged to be no greater than that of ordinary lumber used in on-site construction. Finished surfaces are of materials having a flame spread rating of 200 or less and, unless otherwise marked, a smoke developed rating of 450 or less.

These products are provided with installation and use instructions.

These units are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

UL-certified commercial displays are marked "Certification of this Listed Commercial Display does not include the products that are on display."

Products intended for use only in commercial settings are marked "Commercial Use Only."

Products suitable for outdoor use are marked "Suitable for Outdoor Use."

RELATED PRODUCTS

Commercial Displays (IYMX)–Continued

Illuminated display showcases and cabinets used in commercial applications are covered under Wired Cabinets (ZNXR).

Nonilluminated advertising displays are covered under Advertising Displays, Nonilluminated (AAVU).

Custom-built commercial products, such as ticket machines, electronic point-of-sale products, Internet communication stands and the like are covered under Custom-built Kiosks (EMHH).

ADDITIONAL INFORMATION

For additional information, see Furnishings (IYMR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 962, "Household and Commercial Furnishings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Display."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DECORATIVE FURNISHINGS (IYNA)

USE AND INSTALLATION

This category covers furnishings intended to be used year-round (non-seasonal) that exist for aesthetic enjoyment or an ornamental purpose, such as lava lamps, low-wattage illuminated sculptures, glitter lamps, scrolling scenes, neon sculptures, strobe lamps, mirror balls, plasma lighting globes, motorized sculptures, optical fiber sculptures and wave machines.

These products are typically portable cord-and-plug connected but may be permanently connected.

These products are provided with use instructions and, if permanently connected, installation instructions are also provided.

These products are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

Products intended for use only in dwelling units are marked "Household Use Only"; products intended for use only in commercial settings are marked "Commercial Use Only." If there is no marking, then the product may be used in both dwelling units and commercial settings.

Products suitable for outdoor use are marked "Suitable for Outdoor Use."

RELATED PRODUCTS

This category does not cover portable lamps (cord-connected portable luminaires (lamps), whose primary function is task or ambient illumination, and that can be moved to a new location without the use of tools). Tiffany-type portable lamps and similar lighted decorative lamps are portable lamps rather than a decorative furnishing. Portable lamps are covered under Luminaires, Portable (QOWZ) and Portable Cabinet Luminaires (QOVJ).

This category does not cover decorative outfits intended for seasonal, temporary use, not to exceed 90 days per year, providing a seasonal theme, such as wreaths, stars, tree-top units, sprays, light sculptures, molded figures, such as a pumpkin or a snowman, candles or candle sets without lamp shades, tree stands, and motorized decorative displays having illumination or other decorative effects. Decorative-lighting strings provided with lamp shades or diffusers over the lamps are also considered decorative outfits. Decorative outfits are intended for connection to a receptacle by means of an attachment plug and are portable. Seasonal, temporary use decorative products are covered under Outfits, Decorative (DGXW).

This category does not cover fountains. Fountains are covered under Fountains, Small Decorative (IQRW) or Architectural and Floating Fountains (AWEG).

ADDITIONAL INFORMATION

For additional information, see Furnishings (IYMR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 962, "Household and Commercial Furnishings," ANSI/UL 153, "Portable Electric Luminaires," ANSI/UL 1598, "Luminaires," and UL 2161, "Neon Transformers and Power Supplies."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up

Decorative Furnishings (IYNA)–Continued

Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Decorative Furnishing."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FURNITURE, POWERED AND NONPOWERED (IYNE)

USE AND INSTALLATION

This category covers furnishings provided with or without electrical power typically for lighting and convenience receptacle outlets. They include lighted make-up mirrors, study carrels, consoles, lighted curio cabinets, entertainment centers, headboards, bookcases, desks, tables, laboratory and work benches, and the like.

For commercial units that (1) have a surface area greater than 10 sq. ft. and are intended to be adjacent to other furnishings, or (2) are greater than 20 sq. ft. and intended to stand alone, the surface burning characteristics of building materials employed in these assemblies are judged to be no greater than that of ordinary lumber used in on-site construction. Finished surfaces are of materials having a flame spread rating of 200 or less and, unless otherwise marked, a smoke developed rating of 450 or less.

These products are provided with use instructions and installation instructions when intended for permanent connection.

These units are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

Products intended for use only in dwelling units are marked "Household Use Only"; products intended for use only in commercial settings are marked "Commercial Use Only." If there is no marking, then the product may be used in both dwelling units and commercial settings.

Products suitable for outdoor use are marked "Suitable for Outdoor Use."

RELATED PRODUCTS

Furnishings intended for support of audio or video equipment and provided with casters or secured to the building structure are covered under Carts and Stands for Household, Commercial and Professional Use (CZUV) or Carts, Tall Institutional (CZWK).

Furnishings intended to be used in an office environment and that must be connected together both mechanically and electrically are covered under Office Furnishings (QAWZ).

Interconnected tables provided with convenience receptacle outlets are covered under Powered Table Systems (IYNI).

ADDITIONAL INFORMATION

For additional information, see Furnishings (IYMR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 962, "Household and Commercial Furnishings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Powered Furniture" or "Nonpowered Furniture."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTORIZED FURNISHINGS (IYNG)

GENERAL

This category covers motor-operated furniture, such as nonpatient care beds and lift chairs. This category also covers video display mounts incorporated as part of a furnishing (CRT, plasma, LCD and the like) intended to rest directly on the floor without casters, wheels, etc.

These products are provided with installation and use instructions when intended for permanent connection.

These units are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

Motorized Furnishings (IYNG)—Continued

Products intended for use only in dwelling units are marked "Household Use Only"; products intended for use only in commercial settings are marked "Commercial Use Only." If a product marking is not provided, the product may be used in both dwelling units and commercial settings.

Products suitable for outdoor use are marked "Suitable for Outdoor Use."

RELATED PRODUCTS

Furnishings with casters or wheels intended for use with audio/video equipment are covered under Carts and Stands for Household, Commercial and Professional Use (CZUV).

Tall carts with casters or wheels intended for use with audio/video equipment are covered under Carts, Tall Institutional (CZWK).

Furnishings supplied with all of the video and/or audio components by the manufacturer of those components are covered under Information Technology Equipment Including Electrical Business Equipment (NWGQ) and Audio/Video Apparatus (AZSQ).

Furnishings used for patient care or an individual under medical care are covered under Medical Equipment (PIDF).

ADDITIONAL INFORMATION

For additional information, see Furnishings (IYMR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 962, "Household and Commercial Furnishings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Motorized Chair," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

POWERED TABLE SYSTEMS (IYNI)

USE AND INSTALLATION

This category covers tables intended to be electrically interconnected with each other (two or more) and frequently reconfigured. These tables are provided with receptacles for communication, power and/or video connection. They are used in conference rooms, in an office, library, or school setting.

The surface burning characteristics of building materials employed in these assemblies is judged to be no greater than that of ordinary lumber used in on-site construction. Finished surfaces are of materials having a flame spread rating of 200 or less unless otherwise marked.

This category also covers powered table systems with powered tables connected to one 15 A, 120 V branch circuit, intended for use in unclassified locations in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

These units are provided with installation and use instructions, and are intended to be installed in accordance with the NEC.

PRODUCT MARKINGS

Finished surfaces having a flame spread rating of 200 or less and a smoke developed rating of more than 450 are marked "Smoke Developed Index Over 450."

Each powered table system component (such as a table top or electrical accessory that is shipped separately from the major powered table unit to which it is to be connected) is identified with respect to its intended use and interrelationship with the powered table system (e.g., "For Use with Powered Table System Series ____"). If separable components are factory assembled and shipped together, only the complete assembly and not the component is marked.

These products are marked "Commercial Use Only."

ADDITIONAL INFORMATION

For additional information, see Furnishings (IYMR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 962, "Household and Commercial Furnishings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Powered Table System" or "Powered Table System Part for Use with [Company name] Powered Table System."

Powered Table Systems (IYNI)—Continued

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FURNITURE POWER DISTRIBUTION UNITS (IYNC)

USE AND INSTALLATION

This category covers cord-connected furniture power distribution units rated 250 V ac or less, 16 A ac or less, intended for indoor use. These units consist of single- or multiple-outlet wiring devices that provide power for and are intended to be installed in commercial or household (residential) portable or stationary furnishings only. These units provide outlet receptacles for computers, audio and video equipment, and other equipment that is mounted on or in commercial or household (residential) portable or stationary furnishings. These units are provided with an attachment-plug cap and a flexible cord terminated in an enclosure in which are mounted one or more receptacles, which could include power, phone, data or video receptacles.

Furniture power distribution units may be provided with suitable fuses or other supplementary overcurrent protection, switches and indicator lights singularly or in any combination. These units may also employ surge suppression components (TVSS), electromagnetic interference (EMI) filter components and/or uninterruptible power-supply components. These units are intended only to be used by original equipment manufacturers (OEMs).

These units are not intended to function as general use relocatable power taps (RPTs), nor are they intended for use in fixed furnishings.

These units are intended to be directly connected to a branch circuit receptacle, and are not intended to be series connected (daisy chained) to other furniture power distribution units, extension cords, or similar devices.

Furniture power distribution units have not been investigated and are not intended for use with general patient care areas or critical patient care areas of health care facilities as defined in Article 517 of ANSI/NFPA 70, "National Electrical Code."

RELATED PRODUCTS

Cord-connected multiple-outlet strips intended for general use (e.g., relocatable power taps) are covered under Relocatable Power Taps (XBYS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 962A, "Furniture Power Distribution Units."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Furniture Power Distribution Unit," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FURNISHINGS, HOUSEHOLD AND COMMERCIAL (IYQX)

USE

This category covers miscellaneous furnishings intended for use in homes and/or commercial establishments.

These furnishings are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," and the manufacturer's markings and installation instructions.

PRODUCT MARKINGS

Products intended for use only in dwelling units are marked "Household Use Only"; products intended for use only in commercial settings are marked "Commercial Use Only." If there is no marking, then the product may be used in both dwelling units and commercial settings.

Products suitable for outdoor use are marked "Suitable for Outdoor Use."

RELATED PRODUCTS

Furnishings intended for installation in building structures or equivalent locations are covered under Building Components (IYMT).

Furnishings intended for the display of merchandise are covered under Commercial Displays (IYMX).

Furnishings intended to be used year-round (nonseasonal) that exist for an aesthetic enjoyment or ornamental purpose, such as lava lamps, low-wattage illuminated sculptures, glitter lamps, scrolling scenes, neon sculptures, strobe lamps, mirror balls, plasma lighting globes, motorized sculptures, optical fiber sculptures and wave machines are covered under Decorative Furnishings (IYNA).

Furnishings provided with or without power for such items as lighting and convenience receptacles incorporated within study carrels, consoles, curio cabinets, entertainment centers, headboards, bookcases, desks, and the like are covered under Furniture, Powered and Nonpowered (IYNE).

Motor-operated furniture, such as nonpatient care beds, lift chairs, video display mounts incorporated as part of a furnishing (CRT, plasma, LCD and the like) intended to rest on the floor and not incorporating casters, wheels, etc., is covered under Motorized Furnishings (IYNG).

Furnishings with casters or wheels intended for use with audio/video equipment are covered under Carts and Stands for Household, Commercial and Professional Use (CZUV).

Tall carts with casters or wheels intended for use with audio/video equipment are covered under Carts, Tall Institutional (CZWK).

Audio and video equipment mounting systems intended for mounting to walls, ceilings or another permanent part of a building are covered under Carts and Stands for Household, Commercial and Professional Use (CZUV).

Furnishings supplied with all of the video and/or audio components by the manufacturer of those components are covered under Information Technology Equipment Including Electrical Business Equipment (NWXQ) and Audio/Video Apparatus (AZSQ).

Furnishing tables intended to be electrically interconnected with each other (two or more), frequently reconfigured and provided with receptacles for communication, power and/or video connection, for use in conference rooms, in an office, library, or school setting are covered under Powered Table Systems (IYNL).

Equipment intended for use in hospitals or equivalent locations is covered under Medical Equipment (PIDF).

Other types of furnishings are covered under Tables, Utility (WWJT) and Massage and Exercise Machines (PGXX).

Motor-operated check-out stands (and associated foot and knee controls) intended for use in retail stores to facilitate tally and packing operations are covered under Motor-operated Check-out Stands (DBNT).

ADDITIONAL INFORMATION

For additional information, see Furnishings (IYMR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 962, "Household and Commercial Furnishings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the appropriate product name as shown in the individual Listings.

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FUSED POWER-CIRCUIT DEVICES (IYSR)

GENERAL

This category covers the following devices:

- Enclosed fused power-circuit devices in which the switch is integral with the enclosure
- Open-type fused power-circuit devices intended for mounting in other equipment, such as switchboards, or in a separately shipped enclosure
- Enclosures intended for mounting open-type fused power-circuit devices

These fused power-circuit devices are either bolted-pressure contact switches or high-pressure butt-type contact switches, each defined as follows:

Bolted-pressure contact switch — A device in which the blade-jaw connections have an additional pressure or clamping action provided

at both ends of the switch blades when the blades are in the fully closed position.

High-pressure butt-type contact switch — A device having butt-type contacts and a spring-charged mechanism.

USE AND INSTALLATION

Fused power-circuit devices suitable for use as service switches are marked "Suitable for Use as Service Equipment."

Some fused power-circuit devices incorporate neutrals factory bonded to the frame or enclosure. Such units are marked "Suitable Only for Use as Service Equipment."

Fused power-circuit devices marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system, or for a second building.

Electrically tripped and/or operated fused power-circuit devices may be provided with ground-fault sensing and relaying equipment.

Devices suitable for ground-fault protection but the ground-fault protection sensors or relaying equipment (or both) are located in a separate enclosure are marked "Suitable for Ground Fault Protection When Combined with Class ___ (or Manufacturer and Cat. No.) Ground Fault Sensing Element" or the equivalent.

Devices for use with Class I ground-fault sensing and relaying equipment include those that are capable of interrupting 12 times their rated current or that have integral means to prevent disconnecting at levels of fault current exceeding their contact-interrupting capability.

Devices for use with Class II ground-fault sensing and relaying equipment are capable of interrupting 10 times their rated current and are intended for use in ground-fault protection systems where means to prevent disconnecting at levels of fault current exceeding their contact-interrupting capability are incorporated within the ground-fault sensing and relaying equipment.

Fused power-circuit devices have been investigated for connection to either busbars or pressure wire connectors. Unless the switch is marked "For busbar connection only" or the equivalent, it is provided with pressure wire connectors or marked for use with specific pressure wire connectors. Terminals are intended for use with copper conductors only unless the device is marked to indicate that terminals are also suitable for aluminum conductors.

RATINGS

These devices accommodate Class L or T fuses rated 600 V or less (ac or dc) and have been investigated for use at 100% of their marked ampere rating. The continuous-current rating of a fused power-circuit device is 800, 1200, 1600, 2000, 2500, 3000, 4000, 5000 or 6000 A.

These devices are intended for use on circuits having available fault currents of 100,000, 150,000 or 200,000 rms symmetrical amps or 20,000, 50,000, 100,000, 150,000 or 200,000 amps dc as indicated on the device.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 977, "Fused Power-Circuit Devices."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Fused Power Circuit Device," "Enclosed Fused Power-Circuit Device," "Enclosed Fused Power-Circuit Device Suitable for Use as Service Equipment" or "Fused Power-Circuit Device Enclosure."

On fused power-circuit devices with integral enclosures the Listing Mark is applied to the enclosure. On devices for use in other enclosures (open type) the Listing Mark is applied to the switching unit.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FUSEHOLDERS (IYXV)

FUSEHOLDERS, CARTRIDGE FUSE (IZLT)

GENERAL

This category covers fuseholders intended for use with Class CC, G, H, J, K, R, T, special-purpose and supplementary cartridge fuses.

A Class CTL (current-limiting) cartridge fuseholders has the physical size, configuration or other means which, in conjunction with the physical means provided in a Class CTL assembly, is designed to prevent the installation of more fuseholder poles than the number for which the assembly is designed and rated.

Fuseholders, Cartridge Fuse (IZLT)—Continued

An interrupting rating on a fuseholder included in a piece of equipment does not automatically qualify the equipment in which the fuseholder is installed for use on circuits with higher available currents than the rating of the equipment itself.

PRODUCT MARKINGS

Fuseholders are plainly and legibly marked to indicate:

1. The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product may be identified
2. The current and voltage ratings
3. The withstand rating in rms symmetrical amperes
4. The catalog number (or equivalent)

Fuseholders intended for Class G, J, R, T or CC fuses are marked "Use Class ___ fuses."

Fuseholders with wiring terminals intended for use with copper and aluminum conductors are marked "USE COPPER OR ALUMINUM WIRE" or with the abbreviations "CU" and "AL."

Fuseholders with terminals intended for copper wire only are marked "USE COPPER WIRE ONLY" (or "CU ONLY"). If the terminals are intended for aluminum wire only, the fuseholder is marked "USE ALUMINUM WIRE ONLY" (or "AL ONLY").

Fuseholders rated 100 A having terminals intended to secure a maximum 1 AWG (42.4 mm²) conductor, if marked as being acceptable for aluminum wire, are also marked "FOR ALUMINUM USE NO. 1, 75C WIRE ONLY."

Fuseholders are marked in a readily visible location to indicate the required temperature rating of all field-installed conductors.

Fuseholders are marked to indicate the specific tightening torque in pound-inches or pound-feet for each wire connector in the fuseholder that is intended for field wiring. If different connectors are used for line or load, the specific torques to be applied to each connector are clearly indicated. The torque marking may be provided in a written format or pictorially.

Class CTL cartridge fuseholders may be identified by the words "Class CTL" or "CTL" on the fuseholder as part of the marking.

RELATED PRODUCTS

For information regarding the use of fuses with interrupting ratings in equipment, see Cartridge Fuses, Nonrenewable (JDDZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 4248-1, "Fuseholders - Part 1: General Requirements," in addition to one of the following as applicable:

- ANSI/UL 4248-4, "Fuseholders - Part 4: Class CC"
- ANSI/UL 4248-5, "Fuseholders - Part 5: Class G"
- ANSI/UL 4248-6, "Fuseholders - Part 6: Class H"
- ANSI/UL 4248-8, "Fuseholders - Part 8: Class J"
- ANSI/UL 4248-9, "Fuseholders - Part 9: Class K"
- ANSI/UL 4248-12, "Fuseholders - Part 12: Class R"
- ANSI/UL 4248-15, "Fuseholders - Part 15: Class T"

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fuseholder" or "Cartridge Fuseholder."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FUSEHOLDERS, PHOTOVOLTAIC (IZMR)**GENERAL**

This category covers fuseholders intended for use with fuses for photovoltaic systems.

An interrupting rating on a fuseholder included in a piece of equipment does not automatically qualify the equipment in which the fuseholder is installed for use on circuits with higher available currents than the rating of the equipment itself.

PRODUCT MARKINGS

Fuseholders are plainly and legibly marked to indicate:

1. The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product may be identified
2. The current and voltage ratings
3. The withstand rating in dc amperes
4. The catalog number (or equivalent)
5. The statement "Use Photovoltaic Fuses"

Fuseholders, Photovoltaic (IZMR)—Continued

Fuseholders with wiring terminals intended for use with copper and aluminum conductors are marked "USE COPPER OR ALUMINUM WIRE" or with the abbreviations "CU" and "AL."

Fuseholders with terminals intended for copper wire only are marked "USE COPPER WIRE ONLY" (or "CU ONLY"). If the terminals are intended for aluminum wire only, the fuseholder is marked "USE ALUMINUM WIRE ONLY" (or "AL ONLY").

Fuseholders are marked in a readily visible location to indicate the required temperature rating of all field-installed conductors.

Fuseholders are marked to indicate the specific tightening torque in pound-inches or pound-feet for each wire connector in the fuseholder that is intended for field wiring. If different connectors are used for line or load, the specific torques to be applied to each connector are clearly indicated. The torque marking may be provided in a written format or pictorially.

RELATED PRODUCTS

For information regarding the use of photovoltaic fuses, see Fuses for Photovoltaic Systems (JFGA).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 4248-1, "Fuseholders - Part 1: General Requirements," in addition to the requirements contained in UL Subject 4248-18, "Outline of Investigation for Fuseholders - Part 18: Photovoltaic."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photovoltaic Fuseholder."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FUSEHOLDERS, SPECIAL PURPOSE (IZND)**USE AND INSTALLATION**

This category covers fuseholders intended for use with certified special-purpose fuses.

These fuseholders are designed for special-purpose applications. They incorporate dimensional or other rejection features to prevent the installation of other certified classes of renewable and nonrenewable cartridge fuses.

PRODUCT MARKINGS

Special-purpose fuseholders are marked with their voltage and current rating. When the fuseholders are investigated for use in circuits capable of delivering in excess of 10,000 rms symmetrical amps, fuseholders are marked with their withstand rating. When not so marked, the withstand rating is 10,000 A. A fuseholder marked for use in circuits capable of delivering in excess of 10,000 rms symmetrical amps does not qualify the equipment in which it is installed for use in circuits with higher available currents than may be indicated by the equipment markings.

These fuseholders are designed for use with specific fuses, and are marked with the manufacturer and catalog number of the fuse it is intended to accommodate.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 4248-1, "Fuseholders - Part 1: General Requirements."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Special Purpose Fuseholder."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FITTINGS FOR FUSEHOLDERS (IZZR)

GENERAL

This category covers fuse reducers designed for use in cartridge fuse fuseholders to permit the insertion of fuses of smaller rating, Type S fuse adapters designed for use in Edison-base fuseholders to permit the insertion of Type S fuses, and special adapters designed to permit the use of miscellaneous plug fuses in Edison-base fuseholders to provide supplementary overcurrent protection.

Fuse reducers are primarily intended for use with open fuseholders. The use of fuse reducers in enclosed switches, panelboards, or other enclosures may introduce a hazard due to reduced spacings. Consideration should be given to spacings when fuseholders are used within enclosures.

PRODUCT MARKINGS

Fittings for fuseholders are plainly and legibly marked to indicate:

1. The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product may be identified
2. The current and voltage ratings
3. The catalog number (or equivalent)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 4248-1, "Fuseholders - Part 1: General Requirements," in addition to one of the following as applicable:

- ANSI/UL 4248-4, "Fuseholders - Part 4: Class CC"
- ANSI/UL 4248-5, "Fuseholders - Part 5: Class G"
- ANSI/UL 4248-6, "Fuseholders - Part 6: Class H"
- ANSI/UL 4248-8, "Fuseholders - Part 8: Class J"
- ANSI/UL 4248-9, "Fuseholders - Part 9: Class K"
- ANSI/UL 4248-11, "Fuseholders - Part 11: Type C (Edison Base) and Type S Plug Fuse"
- ANSI/UL 4248-12, "Fuseholders - Part 12: Class R"
- ANSI/UL 4248-15, "Fuseholders - Part 15: Class T"

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fuseholder Fitting," "Fuse Reducer" or "Fuse Adapter," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FUSEHOLDERS, PLUG FUSE (JAMZ)

GENERAL

This category covers fuseholders for Edison base and Type S fuses. Some of these fuseholders are intended for use in panelboards and may include separately certified snap switches.

Fuseholders may be provided on a cover plate for mounting to outlet boxes. These fuseholders are provided with grounding means so that the plate can be grounded when installed on nonmetallic outlet boxes.

Class CTL plug fuseholders may be identified by the words "Class CTL" or "CTL" on the fuseholder as part of the marking.

Class CTL plug fuseholders have physical size, configuration or other means which, in conjunction with the physical means provided in a Class CTL assembly, are designed to prevent the installation of more fuseholder poles than the number for which the assembly is designed and rated.

RELATED PRODUCTS

Fuseholders that are an integral part of a snap switch are covered under Snap Switches (WJQR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 4248-1, "Fuseholders - Part 1: General Requirements," and ANSI/UL 4248-11, "Fuseholders - Part 11: Type C (Edison Base) and Type S Plug Fuse."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word

Fuseholders, Plug Fuse (JAMZ)–Continued

"LISTED," a control number, and the product name "Fuseholder" or "Plug Fuseholder;" or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FUSES (JCQR)

BRANCH-CIRCUIT FUSES (JCSA)

This category covers fuses suitable to provide protection for branch and feeder circuits as defined by ANSI/NFPA 70, "National Electrical Code." These fuses include:

- Cartridge Fuses, Nonrenewable (JDDZ)
- Cartridge Fuses, Renewable (JDRX)
- Plug Fuses (JEFV)

Cartridge Fuses, Nonrenewable (JDDZ)

GENERAL

This category covers nonrenewable cartridge-enclosed fuses, rated as follows:

250 V	0 – 600 A
300 V	0 – 1200 A
600 V	0 – 6000 A

The fuse classes are further categorized as follows:

Class	In (A)	V	DC Rating	Interrupting Rating (kA)		Time Delay	Current-limiting	Body Sizes
				DC	AC			
CA	0 – 30	600	Optional	10, 20, 50, 100, 150 or 200	200	No	Yes	1
CB	0 – 60	600	Optional	10, 20, 50, 100, 150 or 200	200	No	Yes	2
CC	0 – 30	600	Optional	10, 20, 50, 100, 150 or 200	200	Optional	Yes	1
CD	31 – 60	600	Optional	10, 20, 50, 100, 150 or 200	200	Optional	Yes	1
CF	1 – 100	600	Optional	10, 20, 50, 100, 150 or 200	200 or 300	Optional	Yes	9
G	0 – 20 21 – 60	600 480	Optional	10, 20, 50 or 100	100	Optional	Yes	4
H	0 – 600	250 or 600	Optional	10	10	Optional	No	6
J	0 – 600	600	Optional	10, 20, 50, 100, 150 or 200	200	Optional	Yes	6
K	0 – 600	250 600	Optional	10, 20, 50, 100, 150 or 200	50, 100 or 200	Optional	No	6 6
L	601 – 6000	600	Optional	20, 50, 100, 150 or 200	200	Optional	Yes	9
R	0 – 600	250 600	Optional	10, 20, 50, 100, 150 or 200	200	Optional	Yes	6 6
T	0 – 1200 0 – 800	300 600	Optional	10, 20, 50, 100, 150 or 200	200	Optional	Yes	8 7

These fuses are intended for use on ac circuits only, unless also marked with a dc voltage rating. These fuses are suitable for branch circuit, feeder and service overcurrent protection in accordance with ANSI/NFPA 70, "National Electrical Code."

The term "current-limiting" indicates that a fuse, when tested on a circuit capable of delivering a specific short-circuit current (rms amps sym-

PRODUCT CATEGORIES BY CATEGORY CODE

Cartridge Fuses, Nonrenewable (JDDZ)—Continued

- ANSI/UL 248-5, “Low-Voltage Fuses – Part 5: Class G Fuses”
- ANSI/UL 248-6, “Low-Voltage Fuses – Part 6: Class H Nonrenewable Fuses”
- ANSI/UL 248-8, “Low-Voltage Fuses – Part 8: Class J Fuses”
- ANSI/UL 248-9, “Low-Voltage Fuses – Part 9: Class K Fuses”
- ANSI/UL 248-10, “Low-Voltage Fuses – Part 10: Class L Fuses”
- ANSI/UL 248-12, “Low-Voltage Fuses – Part 12: Class R Fuses”
- ANSI/UL 248-15, “Low-Voltage Fuses – Part 15: Class T Fuses”
- UL Subject 248-17, “Outline of Investigation for Low-Voltage Fuses – Part 17: Class CF Fuses”
- UL Subject 248-18, “Outline of Investigation for Low-Voltage Fuses – Class CD Fuses”
- UL Subject 2579, “Outline of Investigation for Low-Voltage Fuses – Fuses for Photovoltaic Systems”

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fuse.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Cartridge Fuses, Renewable (JDRX)

GENERAL

This category covers renewable, cartridge-enclosed fuses, rated as follows:

Class	In (A)	V	DC Rating	Interrupting Rating (kA)	Time Delay	Current-limiting	Body Sizes
H	0 – 600	250	Optional	DC 10 AC 10	Optional	No	6

These fuses are intended for use on ac circuits only unless also marked with a dc voltage rating.

These fuses are suitable for branch circuit, feeder and service overcurrent protection in accordance with ANSI/NFPA 70, “National Electrical Code.”

Renewable fuses of a given voltage rating or current rating range are not interchangeable in the same fuseholder with fuses of a different voltage rating or current rating range.

Each line of renewable links has been investigated only with the same line of fuses from the same manufacturer.

PRODUCT MARKINGS

All devices covered under this category are marked with:

1. The manufacturer’s name or trademark (or both)
2. The current rating
3. The voltage rating
4. The interrupting rating in rms symmetrical and/or dc amperes
5. The device class or classification
6. The word “Renewable”

In addition, each renewal element covered under this category is marked with:

1. The manufacturer’s name or trademark (or both)
2. The current rating
3. The voltage rating

When a fuse has a dc rating, it is marked with the dc voltage and interrupting rating.

These fuses may be marked with the designation “Time Delay,” indicating that they have a time delay characteristic. This is the only designation which indicates that the fuse has been investigated in accordance with the time-delay requirements of the Standard.

Equipment (a switch, motor starter, panelboard, etc.) that has been investigated for use with these fuses is marked with the class of fuse intended to be used in the equipment, and available current rating applicable to that piece of equipment. The equipment, with these fuses installed, is suitable for use on circuits having a maximum available fault current up to the short-circuit rating of the equipment, or the interrupting rating of the fuse, whichever is lower.

An interrupting rating on a fuse included in a piece of equipment does not automatically qualify the equipment in which the fuses are installed for use on circuits with higher available currents than the rating of the equipment itself.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Cartridge Fuses, Renewable (JDRX)—Continued

The basic standards used to investigate products in this category are ANSI/UL 248-1, “Low-Voltage Fuses – Part 1: General Requirements,” and ANSI/UL 248-7, “Low-Voltage Fuses – Part 7: Class H Renewable Fuses.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fuse” or “Fuse Renewal.”

The Listing Mark for fuses is marked on the product; the Listing Mark for fuse renewals is marked on each carton containing fuse renewals, with or without the UL symbol on the renewal.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Plug Fuses (JEFV)

GENERAL

This category covers nonrenewable, Edison base, Type C and Type S plug fuses.

These fuses have the following characteristics:

Type	I _N (A)	V	DC Rating	Interrupting Rating (kA)	Time Delay	Current-limiting	Body Types
Edison base	0 – 30	125	Optional	10	Optional	No	1
Type C							3
Type S							3

PRODUCT MARKINGS

The devices covered under this category, at a minimum, are marked with:

1. The manufacturer’s name or trademark (or both)
2. The device current rating
3. Plug fuses designated as time-delay fuses are identified by the symbol “D” at least 1/8-in. in height, stamped, molded or printed in a location visible after installation of the fuse.

In addition, these devices are not marked “Current-limiting.” Devices rated 15 A or less have a prominent hexagonal feature.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 248-1, “Low-Voltage Fuses – Part 1: General Requirements,” and ANSI/UL 248-11, “Low-Voltage Fuses – Part 11: Plug Fuses.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fuse.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DEFINED-USE FUSES (JDUA)

This category covers fuses intended for specific and defined use. These fuses include:

- Special-purpose Fuses (JFHR)
- Fuses, Automobile (FHXT)
- Cable Limiters (CYMT)

Cable Limiters (CYMT)

GENERAL

This category covers cable limiters of the nonrenewable type, rated 600 V maximum. These cable limiters are intended for use on ac circuits only, unless also marked with a dc voltage rating. They have a current interrupting rating of up to 200,000 rms symmetrical amperes. They are suitable for use with copper or aluminum cable when the wire terminals are so marked.

These cable limiters are intended for supplementary overcurrent protection. They are intended for use, where multiple wires per phase are used, to

Cable Limiters (CYMT)—Continued

isolate an individual wire should it become faulted. They are not intended to be used as branch circuit or feeder protection and have not been investigated for those purposes. Similarly, they have not been investigated to determine their ability to provide overload protection or protection for cable and equipment connected to the load side of the cable limiter. They are not current limiting and will be marked as such.

PRODUCT MARKINGS

These devices are marked with the manufacturer's name or trademark (or both), catalog number, voltage rating, interrupting rating (200,000 or 200 kA), and the cable size with "CU," "AL" or "CU/AL" (as appropriate) following.

Those devices investigated and intended to be secured to conductors by crimping are additionally marked to identify the required crimp tool, die, and number of crimps.

Unless marked to indicate otherwise, these devices are intended for use only in dry locations.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 248-1, "Low-Voltage Fuses - Part 1: General Requirements."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cable Limiter."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Fuses, Automobile (FHXT)

USE

This category covers glass-tube or blade-type fuses intended for use in automotive circuits of not more than 32 V.

PRODUCT MARKINGS

These devices are marked with the manufacturer's or private labeler's name or identifying symbol and the device ampere rating. The ampere rating may take the form of color coding in the case of blade-type fuses.

Blade-type fuses are additionally marked to indicate the voltage rating.

If the manufacturer produces fuses at more than one factory, each fuse carries a marking identifying the factory of manufacture.

ADDITIONAL INFORMATION

For additional information, see Mechanical Equipment and Associated Products (AAME).

REQUIREMENTS

The basic standard used to investigate glass-tube fuses in this category is UL 275, "Automotive Glass-Tube Fuses."

The basic requirements used to investigate blade-type fuses in this category are contained in UL Subject 275A, "Outline of Investigation for Automotive Blade Type Fuses."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Automotive Fuse" (or "Auto Fuse").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Fuses for Photovoltaic Systems (JFGA)

GENERAL

This category covers fuses intended for use in photovoltaic systems. The voltage rating may be up to 1500 V dc (ac ratings are optional). Preferred ratings are 600, 750, 1000, 1250 and 1500 V.

These fuses are intended to be used for the protection of strings or arrays of photovoltaic cells and their associated wiring to provide protection against overloads or low-level short circuits. These types of fuses are not intended to protect downstream inverter components, such as capaci-

Fuses for Photovoltaic Systems (JFGA)—Continued

tors or the discharge of such capacitors back into the arrays or the array wiring. Such protection must be achieved by providing suitable separate capacitor fuses designed, intended and rated for that purpose.

Fuses for photovoltaic systems are nonrenewable, are not current-limiting, and have a minimum interrupting rating of 10 kA. Time-delay ratings are optional.

PRODUCT MARKINGS

These fuses are marked with:

1. The manufacturer's name or trademark (or both)
2. The current rating
3. The voltage rating
4. The interrupting rating in dc amperes

RELATED PRODUCTS

Photovoltaic modules and panels are covered under Photovoltaic Modules and Panels (QIGU).

Photovoltaic modules and panels intended for use in hazardous locations are covered under Photovoltaic Modules and Panels for Use in Hazardous Locations (FCJU).

Photovoltaic modules and panels that are (1) intended to serve as the roof, or as a majority component of the roofing system of a building, (2) intended to serve as part of a structural component of a building, such as a curtain-wall, facade, atrium, skylight, etc., or (3) intended to serve as part of a nonstructural component of a building, such as a curtain wall, facade, atrium, skylight, etc., which is applied extant to the primary building structure, are covered under Building-integrated Photovoltaic Modules and Panels (QHZK).

Mounting systems for building integrated photovoltaic panels are covered under Building-integrated Photovoltaic Mounting Systems (QHZQ).

Permanently-connected photovoltaic charge controllers that control the state of charge of storage batteries used in photovoltaic power systems are covered under Photovoltaic Charge Controllers (QIBP).

Products that use lenses and reflectors to concentrate sunlight on photovoltaic cells to increase output power are covered under Concentrator Photovoltaic Modules and Assemblies (QICP).

Remanufactured flat-plate photovoltaic modules and panels intended for mounting on buildings or on ground-supported frames are covered under Photovoltaic Modules and Panels, Remanufactured (QIGZ).

Inverters intended for use in photovoltaic systems are covered under Static Inverters, Converters and Accessories for Use in Independent Power Systems (QIKH).

Wire intended for use in photovoltaic systems is covered under Photovoltaic Wire (ZKLA).

PV modules and panels certified for the PV Global Approval Mark (GAP) as an extension of the CB Full Certification Scheme are covered under Photovoltaic Modules and Panels Certified for the PV GAP Mark (QIMY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2579, "Outline of Investigation for Low-Voltage Fuses - Fuses for Photovoltaic Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fuse for Photovoltaic Systems," "Photovoltaic Fuse" (or "PV Fuse") or "gPV."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Special-purpose Fuses (JFHR)

GENERAL

This category covers fuses rated 0 - 6,000 A, 0 - 1,000 V with interrupting ratings up to 300,000 A. These fuses are designed for special-purpose applications such as in combination with low-voltage power circuit breakers, in combination with TVSS devices or in combination with capacitors. If they do not incorporate dimensional or other rejection features that make them noninterchangeable with certified classes of renewable and nonrenewable fuses, then they have been investigated and found to comply with all of the performance requirements applicable to certified classes of renewable and nonrenewable fuses for which they may be substituted.

PRODUCT MARKINGS

All devices covered under this category are marked with:

Special-purpose Fuses (JFHR)—Continued

1. The manufacturer's name or trademark (or both)
2. The current rating
3. The voltage rating
4. The interrupting rating in rms symmetrical and/or dc amperes (when not so marked, the interrupting rating is 10,000 A (rms symmetrical))
5. The words "Time Delay" (for qualifying fuses only)
6. The words "Current-limiting" (for qualifying fuses only)
7. These devices may also be marked to indicate if their performance is dependent upon the equipment with which they are designed to be used
8. Fuses that comply with all of the dimensional and performance requirements applicable to a certified class of cartridge fuse may be marked "This fuse may substitute for a Listed Class ___ Fuse," where the appropriate fuse class is placed in the blank
9. Fuses that comply with all of the performance requirements applicable to a certified class of cartridge fuse, but do not comply with the dimensional requirements for that fuse may be marked "This fuse meets the performance specifications for a Class ___ Fuse," or the equivalent

RELATED PRODUCTS

For classes of renewable and nonrenewable fuses, see Cartridge Fuses, Nonrenewable (JDDZ), Cartridge Fuses, Renewable (JDRX) and Plug Fuses (JEFV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 248-1, "Low-Voltage Fuses – Part 1: General Requirements." Additional standards may be used as follows:

USA (UL)	Venue (ANCE)	Mexico (ANCE)	International
ANSI/UL 248-1		NMX-J-009/248/1-2000-ANCE	
ANSI/UL 248-2		NMX-J-009/248/2-2000-ANCE	
ANSI/UL 248-3		NMX-J-009/248/3-2000-ANCE	
ANSI/UL 248-4		NMX-J-009/248/4-2000-ANCE	
ANSI/UL 248-5		NMX-J-009/248/5-2000-ANCE	
ANSI/UL 248-6		NMX-J-009/248/6-2000-ANCE	
ANSI/UL 248-7		NMX-J-009/248/7-2000-ANCE	
ANSI/UL 248-8		NMX-J-009/248/8-2000-ANCE	
ANSI/UL 248-9		NMX-J-009/248/9-2000-ANCE	
ANSI/UL 248-10		NMX-J-009/248/10-2000-ANCE	
ANSI/UL 248-11		NMX-J-009/248/11-2000-ANCE	
ANSI/UL 248-12		NMX-J-009/248/12-2000-ANCE	
ANSI/UL 248-13		NMX-J-009/248/13-2000-ANCE	
ANSI/UL 248-14		NMX-J-009/248/14-2000-ANCE	
ANSI/UL 248-15		NMX-J-009/248/15-2000-ANCE	
ANSI/UL 248-16		NMX-J-009/248/16-2000-ANCE	
UL Subject 248-18			ANSI/IEEE C37.40 (1993)
UL 275			IEEE C37.41 (2000)
UL Subject 275A			ANSI/IEEE C37.42 (1996)
ANSI/UL 347			ANSI/IEEE C37.46 (2000)
			ANSI/IEEE C37.47 (2000)
			ANSI/IEEE C37.48 (1997)

Special-purpose Fuses (JFHR)—Continued

USA (UL)	Venue (ANCE)	Mexico (ANCE)	International
			ANSI/IEEE C37.53.1 (1996)
			IEC 60269-2-1, Ed. 4
			IEC 60127-1
			IEC 60127-2
			IEC 60127-3
			IEC 60127-4
			IEC 60127-5
			* ANSI/UL 248-1 and NMX-J-009/248/1-2000-ANCE, "Low-Voltage Fuses – Part 1: General Requirements"
			* ANSI/UL 248-2 and NMX-J-009/248/2-2000-ANCE, "Low-Voltage Fuses – Part 2: Class C Fuses"
			* ANSI/UL 248-3 and NMX-J-009/248/3-2000-ANCE, "Low-Voltage Fuses – Part 3: Class CA and CB Fuses"
			* ANSI/UL 248-4 and NMX-J-009/248/4-2000-ANCE, "Low-Voltage Fuses – Part 4: Class CC Fuses"
			* ANSI/UL 248-5 and NMX-J-009/248/5-2000-ANCE, "Low-Voltage Fuses – Part 5: Class G Fuses"
			* ANSI/UL 248-6 and NMX-J-009/248/6-2000-ANCE, "Low-Voltage Fuses – Part 6: Class H Nonrenewable Fuses"
			* ANSI/UL 248-7 and NMX-J-009/248/7-2000-ANCE, "Low-Voltage Fuses – Part 7: Renewable Fuses"
			* ANSI/UL 248-8 and NMX-J-009/248/8-2000-ANCE, "Low-Voltage Fuses – Part 8: Class J Fuses"
			* ANSI/UL 248-9 and NMX-J-009/248/9-2000-ANCE, "Low-Voltage Fuses – Part 9: Class K Fuses"
			* ANSI/UL 248-10 and NMX-J-009/248/10-2000-ANCE, "Low-Voltage Fuses – Part 10: Class L Fuses"
			* ANSI/UL 248-11 and NMX-J-009/248/11-2000-ANCE, "Low-Voltage Fuses – Part 11: Plug Fuses"
			* ANSI/UL 248-12 and NMX-J-009/248/12-2000-ANCE, "Low-Voltage Fuses – Part 12: Class R Fuses"
			* ANSI/UL 248-13 and NMX-J-009/248/13-2000-ANCE, "Low-Voltage Fuses – Part 13: Semiconductor Fuses"
			* ANSI/UL 248-14 and NMX-J-009/248/14-2000-ANCE, "Low-Voltage Fuses – Part 14: Supplemental Fuses"
			* ANSI/UL 248-15 and NMX-J-009/248/15-2000-ANCE, "Low-Voltage Fuses – Part 15: Class T Fuses"
			* ANSI/UL 248-16 and NMX-J-009/248/16-2000-ANCE, "Low-Voltage Fuses – Part 16: Test Limiters"
			UL Subject 248-18, "Outline of Investigation for Low-Voltage Fuses – Class CD Fuses"
			UL 275, "Automotive Glass-Tube Fuses"
			UL Subject 275A, "Outline of Investigation for Automotive Blade Type Fuses"
			ANSI/UL 347, "High Voltage Industrial Control Equipment"
			ANSI/IEEE C37.40 (1993), "Standard Service Conditions and Definitions for High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories"
			IEEE C37.41 (2000), "Standard Design Test for High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories"
			ANSI/IEEE C37.42 (1996), "Specification for High-Voltage Expulsion Type Distribution Class Fuses, Cutouts, Fuse Disconnecting Switches and Fuse Links (Replaces NEMA C37.42-1996)"
			ANSI/IEEE C37.46 (2000), "High Voltage Expulsion and Current-Limiting Type Power Class Fuses and Fuse Disconnecting Switches"
			ANSI/IEEE C37.47 (2000), "High Voltage Current-Limiting Type Distribution Class Fuses and Fuse Disconnecting Switches"
			ANSI/IEEE C37.48 (1997), "Guide for the Application, Operation, and Maintenance of High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories"
			ANSI/IEEE C37.53.1 (1996), "High Voltage Current-Limiting Motor-Starter Fuses – Conference Test Procedures"
			IEC 60269-2-1, Ed. 4, "Low-Voltage Fuses – Part 2-1: Supplementary Requirements for Use by Authorized Persons (Fuses Mainly for Industrial Applications) – Sections I to VI: Examples of Standardized Fuses"
			IEC 60127-1, "Miniature Fuses" (general title)
			IEC 60127-1, "Part 1: Definitions for Miniature Fuses and General Requirements for Miniature Fuse-Links"
			IEC 60127-2, "Part 2: Cartridge Fuse-Links"
			IEC 60127-3, "Part 3: Sub-Miniature Fuse-Links"
			IEC 60127-4, "Part 4: Universal Modular Fuse-Links"
			IEC 60127-5, "Part 5: Guidelines for Quality Assessment of Miniature Fuse-Links"

Special-purpose Fuses (JFHR)—Continued

* Tri-national harmonized standard

Where additional standards are used, they are identified in the individual certifications or marked on the product.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fuse."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FUSE ACCESSORIES (JDVS)

GENERAL

This category covers nonrenewable signal-indicating/alarm-actuating devices and fuse covers that are suitable for use with specific certified fuses. The combination is used for branch circuit, feeder and service overcurrent protection in accordance with ANSI/NFPA 70, "National Electrical Code."

These devices have a maximum rating of 600 V ac. They are intended to be used with fuses with an interrupting rating of 10 kA rms or less unless specifically investigated for a higher rating.

Accessories are not intended to be used as branch circuit and service overcurrent protection or supplementary overcurrent protection.

Signal-indicating/Alarm-actuating Devices

These devices are intended to provide actuation of remote certified signaling devices, or to provide a visual indication that a fuse has opened. Their operation is concurrent with that of the fuse, and after operation there is essentially no electrical continuity between the line and load sides of the fuse accessory.

Fuse Covers

These devices are intended to be used with certified branch-circuit fuses. They may be nonindicating, or may be provided with an electrical or electromechanical indicator that operates when a fuse has opened. Fuse covers are intended to provide additional protection against incidental contact with live parts of the fuseholder assembly. The covers are not intended to be used in lieu of spacings in the equipment in which they are used.

PRODUCT MARKINGS

Products covered under this category are marked either on the device or on the smallest unit carton with the class of fuse, fuse amperage rating and the voltage rating of the fuse with which they are intended to be used.

Fuse covers may be designed so that they snap-fit onto the fuse body when the fuse is already installed, or they may be designed such that the fuse is installed in the cover before being inserted into the fuseholder. When the fuse cover is of the latter design, it is not intended to be used to remove a fuse under load, and it is marked "DO NOT OPERATE UNDER LOAD" or the equivalent.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are:

- UL 248-1, "Low-Voltage Fuses – Part 1: General Requirements"
- UL 248-2, "Low-Voltage Fuses – Part 2: Class C Fuses"
- UL 248-3, "Low-Voltage Fuses – Part 3: Class CA and CB Fuses"
- UL 248-4, "Low-Voltage Fuses – Part 4: Class CC Fuses"
- UL 248-5, "Low-Voltage Fuses – Part 5: Class G Fuses"
- UL 248-6, "Low-Voltage Fuses – Part 6: Class H Nonrenewable Fuses"
- UL 248-7, "Low-Voltage Fuses – Part 7: Class H Renewable Fuses"
- UL 248-8, "Low-Voltage Fuses – Part 8: Class J Fuses"
- UL 248-9, "Low-Voltage Fuses – Part 9: Class K Fuses"
- UL 248-10, "Low-Voltage Fuses – Part 10: Class L Fuses"
- UL 248-11, "Low-Voltage Fuses – Part 11: Plug Fuses"
- UL 248-12, "Low-Voltage Fuses – Part 12: Class R Fuses"
- UL 248-13, "Low-Voltage Fuses – Part 13: Semiconductor Fuses"
- UL 248-15, "Low-Voltage Fuses – Part 15: Class T Fuses"
- UL Subject 248-18, "Outline of Investigation for Low-Voltage Fuses – Class CD Fuses"
- UL 275, "Automotive Glass-Tube Fuses"
- Subject 275A, "Outline of Investigation for Automotive Blade Type Fuses"
- ANSI/UL 4248-1, "Fuseholders – Part 1: General Requirements"

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up

Fuse Accessories (JDVS)—Continued

Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fuse Accessory."

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FUSES, SUPPLEMENTAL (JDYX)

USE

This category covers supplemental fuses, which are also described as miscellaneous, miniature, and micro fuses. These fuses provide supplemental protection in end-use equipment to provide protection for components or internal circuits. They are not suitable for branch or feeder circuit use. Physical dimensions are not specified, but dimensional limitations apply to prevent insertion of supplementary protection fuses into branch or feeder circuit fuseholders intended to accommodate branch or feeder circuit fuses of the Class CA, CB, CC, CD, G, H, J, K, L, R or T Type.

Micro fuses are supplemental fuses with no principal dimension (length, width, height or diameter) exceeding 10 mm (excluding leads).

The devices covered under this category are rated as follows:

Type	I _N (A)	V	DC Rating	Min Interrupting Rating (kA)	Time Delay	Current-limiting
Miscellaneous or Miniature fuse	0 - 60	<125	Optional	>I _N	Optional	No
Miscellaneous or Miniature fuse	0 - 60	125	Optional	10, 50 or 100	Optional	No
Miscellaneous or Miniature fuse	0 - 1	125/250	Optional	10, 50 or 100 at 125 V	Optional	No
				0.035 at 250 V		
Miscellaneous or Miniature fuse	1.1 - 3.5	125/250	Optional	10, 50 or 100 at 125 V	Optional	No
				0.10 at 250 V		
Miscellaneous or Miniature fuse	3.6 - 10	125/250	Optional	10, 50 or 100 at 125 V	Optional	No
				0.20 at 250 V		
Miscellaneous or Miniature fuse	10.1 - 15	125/250	Optional	10, 50 or 100 at 125 V	Optional	No
				0.75 at 250 V		
Miscellaneous or Miniature fuse	15.1 - 30	125/250	Optional	10, 50 or 100 at 125 V	Optional	No
				1.5 at 250 V		
Miscellaneous or Miniature fuse	30 - 60	125/250	Optional	10, 50 or 100 at 125 V	Optional	No
				10, 50 or 100 at 250 V		
Micro fuse	0 - 60	Any	Optional	0.050	Optional	No

PRODUCT MARKINGS

Devices covered under this category are marked as follows:

PRODUCT CATEGORIES BY CATEGORY CODE

Fuses, Supplemental (JDYX)—Continued

Type	Required Fuse Markings	Required Smallest Package Markings
Miscellaneous or Miniature fuse	Manufacturer's name or trademark (or both) Device current rating Device voltage rating Device interrupting rating The words "Time Delay" or the letter "D" if device is a time delay type	Manufacturer's name or trademark (or both) Device current rating Device voltage rating Device interrupting rating The words "Time Delay" or the letter "D" if device is a time delay type
Micro fuse	Device current rating	Manufacturer's name or trademark (or both) Device current rating Device voltage rating Device interrupting rating The words "Time Delay" or the letter "D" if device is a time delay type

If a color code is used to mark a micro fuse to designate voltage, interrupting rating or time delay type, the color code scheme is marked on the smallest package.

Devices covered under this category are not marked "Current-limiting."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 248-1, "Low-Voltage Fuses – Part 1: General Requirements," and ANSI/UL 248-14, "Low-Voltage Fuses – Part 14: Supplemental Fuses."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Supplemental Fuse," "Miscellaneous Fuse," "Miniature Fuse" or "Micro Fuse."

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FUSES CERTIFIED TO INTERNATIONAL STANDARDS (JECA)

This category covers fuses certified to international standards. These fuses include:

- Low-voltage Fuses Classified in Accordance with IEC Publications (JEFA)
- Universal Modular Fuses (JGFI)

Low-voltage Fuses Classified in Accordance with IEC Publications (JEFA)

USE

This category covers fuses incorporating enclosed current-limiting fuse links intended for protecting power-frequency ac circuits or dc circuits. These fuses are intended for use by authorized persons as referenced in IEC 60269-2-1, and are intended mainly for industrial applications.

Low-voltage Fuses Classified in Accordance with IEC Publications (JEFA)—Continued

PRODUCT TYPES

These fuses are defined by size and operating characteristics. The available sizes are 000, 00, 0, 1, 2, 3, 4, and 4a.

These fuses are also defined by their utilization category as follows:

- gG** – indicates fuse links with a full-range breaking capacity for general applications
- gM** – indicates fuse links with a full-range breaking capacity for the protection of motor circuits
- aM** – indicates fuse links with a partial range breaking capacity for the protection of motor circuits
- gD** – indicates time delay fuse links with a full-range breaking capacity
- gN** – indicates non-time-delay fuse links with a full-range breaking capacity

RATINGS

The standard values of rated ac voltages are 400 V, 500 V and 690 V. The rated dc voltages are 250 V and 440 V.

Fuses covered under this category have ampere ratings related to size as follows:

Fuse Size	Ampere Range
000	10 to 315
00	6 to 160
0	6 to 160
1	80 to 250
2	125 to 400
3	315 to 630
4	500 to 1000
4a	500 to 1250

PRODUCT MARKINGS

The following information is marked on all fuse-links where practicable: manufacturer's name or trademark, manufacturer's identification reference, size, rated voltage, rated current, breaking range, utilization category, kind of current, and rated frequency (if applicable).

When the size of the fuse link makes it impracticable to include all markings on the fuse link, the manufacturer's name or trademark, manufacturer's identification reference, size, rated voltage, and rated current will be marked.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to evaluate products in this category is International Electrotechnical Commission (IEC) 60269-2, "Low-voltage fuses, Part 2-1: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)" – Sections 1 to V: Examples of types of standardized fuses.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

LOW-VOLTAGE FUSE

IN ACCORDANCE WITH IEC 60269-2-1

No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Universal Modular Fuses (JGFI)

GENERAL

This category covers universal modular fuses (UMF) that provide supplemental protection in end-use equipment to provide protection for components or internal circuits. They are not suitable for branch or feeder circuit use.

UMFs have opening characteristics that are different from supplemental fuses (see JDYX). UMFs may or may not be suitable for substitution in applications where supplemental fuses are used.

CHARACTERISTICS AND RATINGS

These devices have the following characteristics and ratings:

Universal Modular Fuses (JGFI)–Continued


Mounting	Operating Characteristics	I _N (A)	AC (V)	DC (V)	Interrupting Rating (A)
Through-hole or surface mount	FF – Very quick acting	0.032 – 6.3	32	32 (optional)	The greater of 35 or 10 x I _N
	F – Quick acting				
	T – Time delay	63	63 (optional)	The greater of 35 or 10 x I _N	
	TT – Long time delay				
		125	125 (optional)	The greater of 50 or 10 x I _N	
		250	250 (optional)	L – 100 I – 500 H – 1,500	

PRODUCT MARKINGS

Devices rated 250 V are marked on the device itself and on the smallest package with the following information:

1. The manufacturer's name or trademark (or both)
2. The rated current
3. The rated voltage

Note: When the voltage rating is followed by "ac," the UMF is suitable for alternating current circuits only.

4. One of the following operating characteristic symbols: "FF," "F," "T," "TT"
5. Devices rated 250 V are marked with one of the following symbols denoting breaking capacity: "L," "I," "H"
6. The UMF symbol 
7. The statement "IN ACCORDANCE WITH IEC 60127-1-(issue date) and IEC 60127-4-(issue date)" on the product package only

Devices rated less than 250 V are so marked only on the smallest package.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are International Electrotechnical Commission (IEC) 60127-1, "Miniature Fuses," and IEC 60127-4, "Universal Modular Fuse-links."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Universal Modular Fuse" (or "UMF") or the UMF symbol.

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FUSES OVER 600 VOLTS (JEEG)

GENERAL

This category covers power and distribution fuses with voltage ratings above 600 V.

These fuses are intended to provide overcurrent protection in accordance with ANSI/NFPA 70, "National Electrical Code," and are intended for installation in specific metal-enclosed switchgear.

These fuses are not intended to be interchanged with other manufacturers' fuses or with other classes of certified fuses. Each fuse is intended to only be replaced with a fuse of the same manufacturer, type and ratings. The melting times at specified overcurrents are shown by each manufacturer's published time-current curves, which may vary between manufacturers, and between fuse types and/or models.

Where used, the term "current-limiting" indicates a relationship between the cutoff (peak let-through) current to prospective available current, within the current-limiting range of the fuse, in accordance with characteristic curves published by the manufacturer. When operated within its current-limiting range, a current-limiting fuse introduces a high resistance to reduce current magnitude and duration, resulting in subsequent current interruption.

This category covers two major classes of fuses:

Power class fuses are generally used in three-phase applications, in substations, cabinets, or electrical vaults where a large amount of electrical power is being supplied to a distribution system. They are normally used where fault currents are high, X/R ratios are high, and/or severe transient recovery voltages (TRV) are anticipated.

Fuses Over 600 Volts (JEEG)–Continued

Distribution class fuses are generally used in single-phase applications on a distribution line on single-phase taps or for protecting single-phase transformers. They are suitable for use in three-phase applications where the high capabilities of the power class fuse are not required.

Each of these classes is further subdivided into three types:

Back-up current-limiting fuses provide fault current interrupting duty only between their maximum interrupting rating and their minimum interrupting rating. They must be coordinated with other overcurrent protective device(s) which will interrupt below that level.

General purpose current-limiting fuses are not intended to interrupt currents below the current that causes melting of the fuse in not less than 1h. This current is their rated low current, which may be referred to as their rated minimum interrupting rating. They must be coordinated with other overcurrent protective device(s) which will interrupt below that level.

Full range current-limiting fuses are intended to interrupt any current between the minimum current that can cause melting of its elements (at the highest ambient specified by the manufacturer) and its maximum interrupting rating.

Specific devices covered under this category are as follows:

E-rated Fuses

Characteristics — E-rated fuses are current-limiting power fuses in the voltage range of 2.8 kV through 38 kV, intended for use on ac circuits only. E-rated fuses may have either full range or general-purpose characteristics, as designated in the individual certifications.

E-rated fuses have the following melting-time performance characteristics:

An E-rated fuses rated 100 A or less will melt in 300 seconds at an rms current within the range of 200 to 240% of its continuous current rating.

An E-rated fuse rated greater than 100 A will melt in 600 seconds at an rms current within the range of 220 to 264% of its continuous current rating.

The melting times at higher overcurrents are shown by each manufacturer's published time-current curves, which may vary between manufacturers and between fuse types and/or models.

Markings — Each fuse is marked with the manufacturer's name or trademark, manufacturer's type or identification number, rated continuous current, rated maximum voltage, rated frequency, rated maximum interrupting current, and "E" following the continuous current rating (e.g., 100E).

General Purpose Fuses

Characteristics — General purpose fuses are current-limiting power fuses in the voltage range of 2.8 kV through 38 kV, intended for use on ac circuits only. General purpose fuses have general purpose characteristics only.

Markings — Each fuse is marked with the manufacturer's name or trademark, manufacturer's type or identification number, rated continuous current, rated maximum voltage, rated frequency, rated maximum interrupting current, and rated low current.

Fuse Links

Characteristics — Type K and Type T distribution fuse links are for voltages up to 38 kV, intended for use on ac circuits only.

Markings — Each link is marked with the manufacturer's name or trademark and rated continuous current followed by the type identification (e.g., 40K).

The smallest shipping container is required to be marked with the manufacturer's name or trademark, the manufacturer's type or identification number, and rated continuous current, followed by the type identification.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are:

- a. ANSI/IEEE C37.40 (1993), "IEEE Standard Service Conditions and Definitions for High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories"
- b. IEEE C37.41 (2000), "IEEE Standard Design Tests for High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories"

In addition to the standards specified in items a and b above, the basic standard used to investigate general purpose current-limiting power fuses and E-rated fuses is ANSI C37.46 (2000), "American National Standard for High Voltage Expulsion and Current-Limiting Type Power Class Fuses and Fuse Disconnecting Switches."

In addition to the standards specified in items a and b above, the basic standard used to investigate fuse links is ANSI C37.42 (1996), "American National Standard Specification for High-Voltage Expulsion Type Distribution Class Fuses, Cutouts, Fuse Disconnecting Switches and Fuse Links."

Fuses Over 600 Volts (JEEG)—Continued

All fuses covered under this category are intended to be applied as specified in ANSI/IEEE C37.48 (1997), "IEEE Guide for Application, Operation, and Maintenance of High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories".

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "E-rated Fuse," "General Purpose Fuse" or "Fuse Link."

The Listing Mark is marked on the fuse for E-rated and general purpose fuses; the Listing Mark is marked on each package for fuse links, with or without the UL symbol on the fuse link.

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GARAGE EQUIPMENT (JGWW)**USE AND INSTALLATION**

This category covers electrically-operated equipment, rated 600 V or less, intended primarily for use in servicing and repairing automobiles. This category also covers powered and nonpowered cabinets intended primarily for use in service garages, and consisting of floor-supported tool cabinets. Such equipment is intended to be used mainly in commercial garages and gasoline dispensing and service stations. Unless specifically marked for hazardous (classified) locations use, products are intended for use in an area that is considered unclassified based on the classification in ANSI/NFPA 70, "National Electrical Code" (NEC).

Some of the equipment covered under this category incorporates parts that tend to produce arcs or sparks and, therefore, when installed in commercial garages and gasoline dispensing and service stations, should be in areas or enclosures suitable for the purpose in accordance with the NEC. Products incorporating arcing or sparking parts located above 18 in. from floor level (i.e., in an area considered unclassified by the NEC) are provided with instructions which specify that the equipment is not to be installed in a recessed floor area. Products incorporating arcing or sparking parts located below 18 in. from the floor, such as dynamometers, are marked for use in a Class I, Division 2 location, or the equipment should be located where there is mechanical ventilation providing a minimum of four air changes per hour in accordance with Section 511.3 of the NEC. If the equipment is intended to be located below grade level, such as a pit, the product should be marked for Class I, Division 1, or should be located in an area with exhaust ventilation at a rate of 1 cfm/ft² of floor area at all times when the building is occupied or when vehicles are parked over the equipment. The exhaust should be taken from a point within 12 in. of the floor of the pit, in accordance with Table 514.2 of the NEC. In addition, consideration should be given to the surrounding area and its classification in accordance with the NEC. If reliance is placed on ventilation requirements, the installation instructions for the product should specify the necessary ventilation requirements, and the suitability of ventilation should be determined at the installation.

RELATED PRODUCTS

Automotive lifts are covered under Automotive Lifts (BACL).

Battery chargers are covered under Battery Chargers, Nonautomotive Type (BBML).

Refrigerant recyclers and air conditioning charging stations are covered under Refrigerant Recovery/Recycling Equipment, Automotive (SCMA).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category, other than powered or nonpowered cabinets, is ANSI/UL 201, "Garage Equipment."

The basic requirements used to investigate powered or nonpowered cabinets in this category is UL Subject 201A, "Outline of Investigation for Powered and Non-Powered Cabinets for Use in Service Garages."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory), together with the word "LISTED," a control number, and the appropriate product name as shown in the individual Listings.

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GAS APPLIANCE ELECTRIC ACCESSORIES (JHYR)**GENERAL**

This category covers electric accessories for use solely on or with gas appliances and that can be applied without alteration to the appliance. They are intended for household, commercial or industrial use in accordance with ANSI/NFPA 70, "National Electrical Code."

Electric accessories suitable for use in gas appliances but also suitable for use in electric and/or oil appliances are included under the category applicable to the specific accessory.

PRODUCT MARKINGS

Gas appliance electric accessories are marked with the company's name or trademark, a distinctive catalog number, and the electrical ratings. Additional markings may be required based on the individual certification reports.

RELATED PRODUCTS

Safety controls for gas- and oil-fired appliances, electric central furnaces, boilers and duct heaters are covered under Controls, Limit (MBPR), Controls, Primary Safety (MCCZ) or Switches (MFHX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are one or more of the following:

ANSI/UL 353, "Limit Controls"

ANSI/UL 372, "Automatic Electrical Controls for Household and Similar Use - Part 2: Particular Requirements for Burner Ignition Systems and Components"

ANSI Z21.20, "Automatic Gas Ignition Systems and Components"

ANSI Z21.77/CSA 6.23, "Manually Operated Piezo-Electric Spark Gas Ignition Systems and Components"

ANSI Z21.92/CSA 6.29, "Manually Operated Electric Gas Ignition Systems and Components"

The standard designation is noted in the individual certification reports.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Gas Appliance Electric Accessory," or other appropriate product name as shown in the individual Listings.

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GAS DETECTORS, RESIDENTIAL AND RECREATIONAL VEHICLE (JKIS)**USE AND INSTALLATION**

This category covers gas detectors intended to detect natural gas and LP-gas (propane) that may be present in residential buildings or recreational vehicles as a result of gas leaking from gas-fired equipment. These devices are intended to sound an alarm at or below 25% of the lower flammable limit of natural gas or LP-gas (propane).

Installation limitations, if any, are marked on the device. Reference should also be made to the manufacturer's installation and use instructions accompanying the product.

These devices are not suitable for installation in hazardous (classified) locations as defined in ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

Each product is marked to indicate its intended use. This consists of the term "Residential Gas Detector" or "Recreational Vehicle Gas Detector."

FACTORS NOT INVESTIGATED

These devices have not been investigated for use as smoke or fire detectors.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1484, "Residential Gas Detectors."

UL MARK

The Signaling Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Emergency Signaling Equipment" or "Emergency Signaling Subassembly."

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

E - Emergency Signaling Equipment

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GAS AND VAPOR DETECTION EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (JLVV)

USE

This category covers gas and vapor detectors and associated equipment used for detecting specific gases and vapors that may be present in the atmosphere incidental to operations or from accidental release and for determining the extent of such release. They may be (1) of the portable type powered by batteries, (2) intended for permanent installation in accordance with ANSI/NFPA 70, "National Electrical Code," or (3) intended for installation in panel assemblies in accordance with the instructions provided.

These gas and vapor detectors have been investigated for risk of explosion, fire and electric shock only. They have not been investigated for performance relative to their ability to detect gases or vapors.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY*] FOR USE IN HAZARDOUS LOCATIONS ONLY AS TO INTRINSIC SAFETY

Control No.
or

[PRODUCT IDENTITY*] FOR USE IN HAZARDOUS LOCATIONS AS TO FIRE, ELECTRICAL SHOCK AND EXPLOSION HAZARDS ONLY

Control No.

* (COMBUSTIBLE) GAS DETECTOR or (COMBUSTIBLE) VAPOR DETECTOR (the word "Combustible" in the product identity is optional)

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GAS AND VAPOR DETECTION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (JTNQ)

GAS AND VAPOR DETECTION EQUIPMENT ENCLOSURES FOR USE IN HAZARDOUS LOCATIONS (JTOL)

USE

This category covers enclosures intended for use in one or more of the following hazardous locations, as indicated on the individual product, in accordance with ANSI/NFPA 70, "National Electrical Code": Class I, Groups A, B, C and D; Class II, Groups E, F and G.

This category covers only the enclosures. Gas sensors or other devices that may be contained within these enclosures are not covered under this category.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

ENCLOSURE FOR USE IN HAZARDOUS LOCATIONS AS TO EXPLOSION AND FIRE HAZARD ONLY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

GAS AND VAPOR DETECTION EQUIPMENT CLASSIFIED FOR USE IN HAZARDOUS LOCATIONS (JTPD)

USE AND INSTALLATION

This category covers gas and vapor detectors and associated equipment designed for detecting specific gases and vapors that may be present in the atmosphere, incidental to operations or from accidental release, and for determining the extent of such release. They may be (1) of the portable type powered by batteries, (2) intended for permanent installation in accordance with ANSI/NFPA 70, "National Electrical Code," or (3) intended for installation in panel assemblies in accordance with the instructions provided.

These detectors have been investigated for risk of explosion, fire and electric shock only. They have not been investigated for performance relative to their ability to detect gases or vapors.

RELATED PRODUCTS

Gas detectors investigated for their performance relative to their ability to detect gas are covered under Gas and Vapor Detection Equipment Listed for Use in Hazardous Locations (JTPX).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

GAS AND VAPOR DETECTION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (JTNQ)

Gas and Vapor Detection Equipment Classified for Use in Hazardous Locations (JTPD)—*Continued*

[PRODUCT IDENTITY*] FOR USE IN HAZARDOUS LOCATIONS ONLY AS TO INTRINSIC SAFETY Control No.

or

[PRODUCT IDENTITY*] FOR USE IN HAZARDOUS LOCATIONS AS TO FIRE, ELECTRICAL SHOCK AND EXPLOSION HAZARDS ONLY Control No.

*(COMBUSTIBLE) GAS DETECTOR or (COMBUSTIBLE) VAPOR DETECTOR (the word “Combustible” in the product identity is optional) The words “Hazardous Locations” may be abbreviated “Haz. Loc.” or “Haz. Locs.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

GAS AND VAPOR DETECTION EQUIPMENT LISTED FOR USE IN HAZARDOUS LOCATIONS (JTPX)

GENERAL

This category covers gas and vapor detectors and associated equipment intended for detecting specific gases and vapors that may be present in the atmosphere incidental to operations or from accidental release and for determining the extent of such release. They may be (1) of the portable type powered by batteries, (2) intended for permanent installation in accordance with ANSI/NFPA 70, “National Electrical Code,” or (3) intended for installation in panel assemblies in accordance with the instructions provided.

Gas and vapor detectors in any of the groups under Class I hazardous locations have been tested with respect to safety of operation of the instrument in the presence of flammable and explosive mixtures of representative gases and vapors with air. The flame arresters provided in the intake and suction lines of these instruments have been tested in the presence of flammable and explosive mixtures representative of the gases and vapors that the instruments are designed to detect and of the hazardous locations for which the detector has been certified. Associated equipment may not necessarily be suitable for use in hazardous locations.

These instruments, when installed, maintained and operated in compliance with the manufacturer’s instructions, indicate the percentage of concentration or percentage of the lower flammable limits of the specific gases and vapors. In some cases, meter readings must be interpreted in accordance with calibration data furnished by the manufacturer.

Gas and vapor detectors should be calibrated and inspected by the operator in compliance with the manufacturer’s instructions, as performance of the instruments will depend on proper maintenance. The instruments should be calibrated with known gas- or vapor-air mixtures at intervals, and particularly after replaceable sensors incorporated in the detecting unit are replaced. Certain gases and vapors may adversely affect (poison) the sensors, and the use of the instruments in sampling atmospheres containing gases or vapors for which they have not been previously calibrated should, therefore, be avoided.

Minor variations in the flow of sample aspirated to the detecting unit do not affect the operation of these instruments to any great extent. However, as the instruments become inoperative in the event of clogging of sampling lines, flame arresters or filters, precautions should be taken to keep these components clean and free from obstructions. Where condensation of vapors occurs in the detecting unit, or in the sampling lines and fittings, erroneously low indications by the instrument may result. Absorption of appreciable amounts of certain gases and vapors by nonmetallic tubing used as sampling lines may also result in incorrect indications by the instrument.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standards used to investigate products in this category are ANSI/UL 508, “Industrial Control Equipment,” and ANSI/ISA-12.13.01, “Performance Requirements for Combustible Gas Detectors.”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “(Combustible) Gas Detector for Hazardous Locations” or “(Combustible) Vapor Detector for

GAS AND VAPOR DETECTION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (JTNQ)

Gas and Vapor Detection Equipment Listed for Use in Hazardous Locations (JTPX)—*Continued*

Hazardous Locations,” or other appropriate product name as shown in the individual Listings. The word “Combustible” in the product name is optional.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

GENERATORS (JZGZ)

GENERAL

This category covers electric generators (also referred to as generator heads) capable of 40 kW or more continuous rated output. They are intended for installation in accordance with ANSI/NFPA 70, “National Electrical Code.”

PRODUCT MARKINGS/INSTALLATION INSTRUCTIONS

An enclosed-type generator has the enclosure type designation marked on the generator for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ). The generator may also be marked “Raintight” or “Rainproof.”

An enclosed-type generator is not intended to be installed in an enclosure unless a marking on the generator, the installation instructions, or a stuffer sheet provided with the generator states that the generator may be enclosed. Specifications for the enclosure are included with the instructions or marking.

An open-type generator is intended to be installed in an enclosure suitable for the end use. The minimum size of the enclosure is marked on the generator, provided in the installation instructions, or as a stuffer sheet provided with the generator.

A generator that has running heating and locked-rotor protection is marked “Thermally Protected.”

Generators are marked for use in a 40°C (104°F) or higher ambient.

All generators are provided with installation instruction information, which indicate the proper methods to secure the generator, electrically connect the generator to the prime mover, and connect it to the generator drive. The instructions also provide information concerning the load rating at which the generator can operate.

FIELD-EVALUATED PROVISIONS

Suitability of guards for the shaft or other moving parts must be determined in the end-use application.

If a generator does not have thermal protection as described above, protection needs to be provided in the end-use application such as an overload relay. The generator has a marking indicating that the generator is not provided with thermal protection.

RELATED PRODUCTS

Electric generators for use in marine applications are covered under Alternators, Generators and Motors, Electric, Marine (ARDY).

Electric generators for use in hazardous (classified) locations are covered under Generators for Use in Hazardous Locations (PSPT).

Electric generators used in combination with an engine for use with recreational vehicles are covered under Engine Generators (FTSR).

Motor generator sets and frequency converters intended for use in unclassified locations are covered under Motor-Generator Sets (PQYW).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1004-1, “Rotating Electrical Machines – General Requirements,” and ANSI/UL 1004-4, “Electric Generators.”

Where indicated in the individual certifications, the spacings provided within these motors have additionally been investigated to ANSI/UL 840, “Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Generator” or “Electric Generator Head.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

GROUND-FAULT CIRCUIT INTERRUPTERS (KCXS)

GENERAL

This category covers ground-fault circuit interrupters (GFCI) for use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

A GFCI is a device whose function is to interrupt the electric circuit to the load when a fault current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the circuit.

GFCIs are intended to be used only in circuits where one of the conductors is solidly grounded.

Class A GFCIs trip when the current to ground has a value in the range of 4 through 6 mA. Class A GFCIs are suitable for use in branch and feeder circuits, including swimming pool circuits. However, swimming pool circuits installed before local adoption of the 1965 NEC may include sufficient leakage current to cause a Class A GFCI to trip.

GFCIs of the enclosed type that have not been found suitable for use where they will be exposed to rain are so marked.

The "TEST" and "RESET" buttons on the GFCIs are only intended to check for the proper functioning of the GFCI. They are not intended to be used as "ON/OFF" controls of motors or other loads unless the buttons are specifically marked "ON" and "OFF." Products with "ON" and "OFF" markings have been additionally covered under Motor Controllers, Mechanically Operated and Solid-state (NMF).

Receptacle GFCIs

Some GFCIs include flush receptacles and are intended to be installed in an outlet box for fixed installation on a branch circuit similar to a conventional receptacle.

Receptacle-type GFCIs for use in wet and damp locations in accordance with Articles 406 of the NEC are identified by the words "Weather Resistant" or the letters "WR" where they will be visible after installation with the cover plate secured as intended.

Weather-resistant receptacle-type GFCIs installed in wet locations are intended to be installed with an enclosure that is weatherproof, whether or not the attachment plug cap is inserted.

Receptacle-type GFCIs for use in dwelling units in accordance with Section 210.52 of the NEC, or pediatric patient care areas in accordance with Article 517 of the NEC, are identified by the words "Tamper Resistant" or the letters "TR" where they will be visible after installation with the cover plate removed.

Receptacle-type GFCIs that have additionally been found to meet appropriate receptacle requirements are marked "Hospital Grade" and/or "CO/ALR."

Receptacle-type GFCIs with receptacles rated 15 or 20 A that are provided with more than one set of terminals for the connection of line and neutral conductors are suitable for through wiring on 20 A branch circuits.

The standard horsepower ratings for specific general-use receptacle configurations are also applicable to the receptacle portion of a GFCI employing the same receptacle configuration.

See Receptacles for Plugs and Attachment Plugs (RTRP) for further information.

Portable GFCIs

This category also covers portable GFCIs. These are plug-in type ground-fault circuit interrupters provided with male blades or an integral power-supply cord for connection to a receptacle outlet. Portable GFCIs are also provided with one or more receptacle outlets located on the GFCI or on a cord-connector body at the end of a length of flexible cord.

Self-contained GFCIs

Self-contained GFCIs are provided with a complete enclosure intended to be permanently attached to the mounting surface, and a means of permanent connection to the supply conductors. They may be provided with one or more receptacle outlets or a means for permanent connection of the load conductors.

All self-contained GFCIs intended for installation in a counter are suitable for installation in a kitchen or bathroom countertop. They are provided with one or more receptacle outlets. The outlets may be fixed or retractable for storage below the counter surface.

REBUILT PRODUCTS

This category also covers rebuilt or refurbished portable GFCIs that are rebuilt or refurbished by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt or refurbished portable GFCIs are rebuilt or refurbished to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt or refurbished portable GFCIs are subject to the same requirements as new portable GFCIs.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 943, "Ground-Fault Circuit-Interrupters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ground-fault Circuit Interrupter."

For portable GFCIs, the word "Portable" precedes the product name.

For rebuilt products the word "Rebuilt" or "Refurbished" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SPECIAL-PURPOSE GROUND-FAULT CIRCUIT INTERRUPTERS (KCYC)

USE

This category covers ground-fault circuit interrupters (GFCI) for use in applications where equipment grounding is provided or is required by ANSI/NFPA 70, "National Electrical Code" (NEC), or where the voltage to ground is greater than 150 V.

PRODUCT CHARACTERISTICS

These GFCIs trip when the current to ground has a value in the range of 15 through 20 mA. Let-go protection is not provided by the GFCI; however, a person touching the protected equipment and earth would have a low-impedance equipment grounding path in parallel with the person's body.

These GFCIs rely upon equipment grounding for let-go protection. The reliability of the grounding circuit may be demonstrated by a system that monitors the grounding path to the service and to the load, such that an unacceptable increase in the resistance of the grounding path will cause the circuit to be opened, or by some other method that demonstrates, by investigation, that the grounding circuit is reliable or that faults are unlikely because of the level of insulation that is provided (double insulation).

CLASSES

These GFCIs are divided into classes based upon voltage rating and the quality of the grounding circuit. Some may be used in circuits where grounding is not provided to the load but double insulation is provided.

A Class C GFCI is intended to be used in circuits with voltage not exceeding 300 V AC to ground on any conductor. Class C GFCIs are intended to be used in circuits where reliable equipment grounding or double insulation is provided or is required by the NEC.

A Class D GFCI is intended to be used in circuits with one or more conductors over 300 V to ground, where specially sized reliable equipment grounding, to provide a low impedance path so that the voltage across the body during a fault does not exceed 150 V, is provided for the protected equipment in the system.

A Class E GFCI is intended to be used in circuits with one or more conductors over 300 V to ground but with conventional equipment grounding or double insulation provided for the protected equipment in the system. These GFCIs respond rapidly to open the circuit before the magnitude and duration for the current flowing through a person's body exceeds the limits for ventricular fibrillation.

RELATED PRODUCTS

For additional information, see Ground-fault Circuit Interrupters (KCXS) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 943, "Ground-Fault Circuit Interrupters," as modified by UL Subject 943C, "Outline of Investigation for Special Purpose Ground-Fault Circuit Interrupters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Class ___ Ground-Fault Circuit Interrupter, Special Purpose."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

GROUND-FAULT CIRCUIT INTERRUPTERS FOR USE IN HAZARDOUS LOCATIONS (KCYN)

GENERAL

This category covers ground-fault circuit interrupters (GFCI) intended for use in accordance with ANSI/NFPA 70, "National Electrical Code." These devices are mounted in explosion-proof and/or dust-ignition-proof enclosures.

GFCIs interrupt the electric circuit to the load when a fault current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the circuit.

GFCIs are intended to be used only in circuits where one of the conductors is solidly grounded.

Class A GFCIs trip when the current to ground has a value in the range of 4 through 6 mA. Class A GFCIs are suitable for use in branch and feeder circuits.

The "TEST" and "RESET" buttons on GFCIs are only intended to check for the proper functioning of the GFCI. They are not intended to be used as "ON" and "OFF" controls of motors or other loads unless the buttons are specifically marked "ON" and "OFF."

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 943, "Ground-Fault Circuit Interrupters."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ground Fault Circuit Interrupter for Use in Hazardous Locations" or "Ground-Fault Interrupter for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

GROUND-FAULT SENSING AND RELAYING EQUIPMENT (KDAX)

USE

This category covers ground-fault-current-sensing devices, relaying equipment, or combinations of ground-fault-current-sensing devices and relaying equipment which operates to cause a disconnecting means to function at predetermined values of ground-fault current in accordance with ANSI/NFPA 70, "National Electrical Code."

This equipment is intended for use on single-phase circuits rated 600 V maximum, or three-phase circuits rated 600 V maximum, phase to phase.

This equipment is intended to provide ground-fault protection of equipment at services and feeders.

This equipment is intended to operate devices with shunt-trip coils, such as fused power-circuit devices, molded-case circuit breakers, molded-case switches and the like, which constitute the disconnecting means. It is necessary that ground-fault-sensing and relaying equipment be coordinated with a disconnecting device to prevent the disconnecting device from interrupting a fault current that exceeds the interrupting capability of the disconnecting means.

To aid the user in making the proper selection of disconnecting means and sensing and relaying equipment, the sensing and relaying devices are designated as Class I or Class II:

Class I ground-fault-sensing and relaying equipment does not incorporate means to prevent opening of a disconnecting device at any level of fault current. This Class is suitable for use with a disconnecting device that is capable of interrupting the maximum available fault current of the system on which it is used. Examples of such disconnecting devices are (1) circuit breakers or fused circuit breakers used within their interrupting ratings, (2) fused switches having integral means to prevent the switch from opening at levels of fault current exceeding the interrupting capability of the switch and thus permitting the fuses to clear the circuit, (3) fused switches having an interrupting capability not less

than 12 times their amp rating and which are capable of interrupting the levels of fault current that may exist before the fuses open.

Class II ground-fault-sensing and relaying equipment incorporates means to prevent initiation of opening of the disconnecting device if the fault current exceeds the contact interrupting capability of the disconnecting device with which it is intended to be used, such as in the case of a fused switch that does not have an interrupting capability of at least 12 times its amp rating.

This category covers enclosed equipment and also open-type equipment intended for use in certified equipment such as panelboards, switchboards and the like, where the acceptability of the combination has been determined by UL.

PRODUCT MARKINGS

Ground-fault-sensing and relaying equipment is marked to indicate the maximum inrush and sealed current ratings of the output circuit. These values should be compatible with the ratings of the tripping coils of the associated disconnecting devices.

Ground-fault-sensing and relaying equipment is marked to indicate the maximum available fault currents it is capable of withstanding without damage.

Ground-fault-sensing and relaying equipment additionally covered under Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ) and not marked "Line" and "Load" are suitable for operation with a supply source connected to either side.

Ground-fault-sensing and relaying equipment not additionally covered under DIVQ has not been investigated for operation with a supply source connected to the load-side terminals unless identified as suitable for back-feeding.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1053, "Ground-Fault Sensing and Relaying Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ground Fault Sensing and Relaying Equipment."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

GROUNDING AND BONDING EQUIPMENT (KDER)

USE

This category covers bonding devices, ground clamps, grounding and bonding bushings and locknuts, ground rods, armored grounding wire, protector grounding wire, grounding wedges, ground clips for securing the ground wire to an outlet box, water-meter shunts, and similar equipment.

Some devices are to be assembled to wire using a special tool specified by the manufacturer. Such special tooling is identified by appropriate marking on or within the device shipping carton.

Armored Grounding Wire — Armored grounding wire consisting of a single corrosion-resistant copper, aluminum or copper-clad aluminum conductor within helically-formed steel armor is marked with the size of the conductor "Bare Armored Grounding Wire."

Ground Rods — Ground rods and pipe electrodes are suitable for use as grounding electrodes in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), and are also suitable for use in installation of lightning protection equipment.

Ground rods are solid copper, solid stainless steel, copper-jacketed steel, stainless-steel jacketed, galvanized steel, and chemically charged. They are not less than 1/2 in. diameter and not less than 8 ft long and capable of being driven to a depth of 8 ft. If other than circular, they have a periphery not less than 1.6 in. and a minimum thickness of not less than 3/8 in.

Ground rods are marked with the rod length, and manufacturer's name and catalog number within 12 in. of the top of the rod.

The ground rods of a sectional ground-rod kit consisting of two four-foot sections of ground rods, a driving sleeve, and a ground rod coupling are marked with the manufacturer's name, catalog number, rod size and length, and "Sectional Ground Rod" within 12 in. of the top of each rod.

Ground-rod couplings are intended for connection of two ground rods and are suitable for direct burial.

Plate Electrodes — Plate electrodes are suitable for use as grounding electrodes in accordance with the NEC.

Plate electrodes are bare or conductively coated iron or steel, or solid uncoated nonferrous metal (other than aluminum).

Plate electrodes are marked with the manufacturer's name, trade name, or both.

Ground Clamps — Strap-type ground clamps are not suitable for attachment of the grounding conductor of an interior wiring system to a grounding electrode.

Ground clamps and other connectors suitable for use where buried in earth or embedded in concrete are marked for such use. The marking may be abbreviated "DB" (for "Direct Burial").

Ground clamps are also suitable for telecommunication applications, such as telephone, radio, CATV and the like, in accordance with Articles 800, 810, 820 and Section 250.94 of the NEC, in addition to those covered under Grounding and Bonding Equipment, Communication (KDSH).

Ground clamps intended for use with ground rods and/or pipe electrodes in accordance with the NEC are marked with the size of electrode and electrode grounding conductor with which the clamp is intended to be used. Clamps suitable for use on copper water tubing are marked "Copper Water Tubing," or the equivalent, preceded or followed by the size of tubing. Ground rods, pipe electrodes and water tubing trade sizes are stated in fractions, such as 1/2, 5/8, etc.

Ground clamps intended for use with re-bar are marked with the size of re-bar with which the clamp is intended. Re-bar sizes may be specified in fractions, such as 1/2, 5/8, etc., or a number, such as 3, 4, 5, etc., where the number represents the numerator of the fraction when stated in eighth-inch increments, e.g., 4 = 4/8.

Ground clamps intended for use on a brass hex fitting are marked "BF-X," where "X" is replaced by a numeric number, fraction, or range of numbers representing the fitting size.

Grounding and Bonding Bushings — Bonding bushings for use with conduit fittings, tubing (EMT) fittings, threaded rigid metal and intermediate metal conduit, or unthreaded rigid metal and intermediate metal conduit are provided with means (usually one or more set screws) for reliably bonding the bushing (and the conduit on which it is attached) to the metal equipment enclosure or box. They provide the electrical continuity required by the NEC at service equipment and for circuits rated over 250 V. Means for connecting a grounding or bonding conductor are not provided and if there is need for such a conductor a grounding bushing should be used.

Grounding bushings for use with conduit fittings, tubing (EMT) fittings, threaded rigid metal and intermediate metal conduit, or unthreaded rigid metal and intermediate metal conduit have provision for the connection of a bonding or grounding wire or have means for mounting a wire connector available from the manufacturer. Such a bushing may also have means (usually one or more set screws) for reliably bonding the bushing to the metal equipment enclosure or box in the same manner that this is accomplished by a bonding bushing. Grounding bushings provide the electrical continuity required by the NEC at service equipment and for circuits rated over 250 V. They may be used with or without a bonding or grounding conductor as determined by the bonding or grounding function that is intended to be accomplished.

Insulating throat liners in grounding or bonding bushings are suitable for temperatures of 150°C if they are black or brown in color. Unless otherwise marked, insulating throat liners of any other color are suitable for temperatures of 90°C.

Grounding and Bonding Locknuts — Grounding and bonding locknuts serve in a manner similar to grounding and bonding bushings except they do not provide abrasion protection for the conductor at the end of the conduit.

Grounding and Bonding Hubs — Grounding and bonding hubs are certified hubs (see DWTT) provided with a certified grounding or bonding locknut. They serve in a manner similar to grounding and bonding bushings except they are only for use with threaded rigid metal and intermediate metal conduit. Grounding hubs provide the electrical continuity required by NEC 250.92 at service equipment and the electrical continuity required by NEC 250.97 for circuits rated over 250 V.

Ground Clips — Ground clips are intended to be pressed on the flat surface of a square, rectangular, or octagonal box to hold a grounding conductor against the sidewall of the box. Ground clips are not intended for use with round boxes. Ground clips are typically used for connecting the grounding conductor of various wiring methods to outlet boxes or for connecting the bonding jumper from a receptacle, switch or other device to an outlet box.

Ground Mesh — The ground mesh consists of a copper wire mesh that is intended to be installed in ground or embedded in concrete and bonded to the grounding electrode system for the purpose of improving ground planes, such as an equipotential plane as described in Sections 547.2, 547.10 and 680.26 of the NEC. Ground mesh is not intended to serve as a required grounding electrode as described in Article 250 of the NEC.

Fittings — A fitting such as a hub, bushing or locknut intended to provide a raintight or liquidtight connection is marked "Raintight," "Type 3R," "Type 4" or "Wet Locations."

Protector Grounding Wires — Protector grounding wires are intended for use in accordance with Article 800 of the NEC. They are marked with the manufacturer's name, size, and "Protector Grounding Wire."

Water-meter Shunts — Consists of a 4 AWG or larger solid copper wire connected between two ground clamps that comply with requirements for such ground clamps.

Grounding and Bonding for Photovoltaic (PV) Systems — Grounding and bonding equipment intended for use in PV systems are additionally investigated in combination with the PV module/panel (see QIGU) to the applicable requirements for such products. Installation instructions provided with the PV system (see QIGU) identify the specific grounding and bonding device that has been investigated and intended for use with that system.

Grounding Couplings — Grounding couplings are certified rubber-gasketed fittings (see VIZM) that have been additionally investigated for grounding/bonding in a 200 A maximum service-entrance capacity.

Miscellaneous Devices — Grounding and bonding equipment not specifically mentioned above, such as bonding locknuts, gaskets, grounding wedge lugs, adapters, grounding grids and the like, are investigated under the intent of the requirements in the standard.

PRODUCT MARKINGS

Some of the markings referred to above may be on a tag attached to the product.

Grounding and bonding devices are intended for use only with copper conductors unless they are marked "AL" or "AL-CU."

RELATED PRODUCTS

Hospital grounding jacks and grounding cord assemblies are covered under Hospital Ground Jacks and Grounding Cord Assemblies (KEVX).

Equipment for grounding and bonding for telecommunication applications is covered under Grounding and Bonding Equipment, Communication (KDSH).

Grounding and bonding hubs may additionally be covered as a hub under Conduit Fittings (DWTT).

Swimming pool equipotential bonding kits that are only intended to provide an intentional conductive bond to the pool water in accordance with Section 680.26(C) of the NEC are covered under Swimming Pool and Spa Equipment, Miscellaneous (WDUT).

Grounding couplings are additionally covered under Fittings, Rubber Gasketed (VIZM).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 467, "Grounding and Bonding Equipment."

UL MARK

The Listing Mark of UL on the product, on a tag securely attached to the product or container, or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Grounding Equipment," "Bonding Equipment," "Bonding Jumper," "Ground Clamp," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

GROUNDING AND BONDING EQUIPMENT, COMMUNICATION (KDSH)

USE

This category covers grounding devices intended for use in telecommunication applications, such as telephone, radio, CATV and the like, in accordance with Articles 800, 810, 820 and Section 250.94 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Strap-type ground clamps constructed of perforated or expanded metal are suitable for grounding conductor connections to electrodes for indoor telecommunication purposes only. Where permitted by the NEC, they are also suitable in both indoor and outdoor applications when used for bonding purposes only.

Strap-type ground clamps are intended for use with pipe electrodes in accordance with the NEC and are marked with the size of electrode and electrode grounding conductor with which the clamp is intended to be used. Clamps suitable for use on copper water tubing are marked "Cop-

**GROUNDING AND BONDING EQUIPMENT,
COMMUNICATION (KDZH)**

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per Water Tubing” or the equivalent, preceded or followed by the size of tubing. Pipe electrodes and water tubing trade sizes are stated in fractions, such as 1/2, 5/8, etc.

PRODUCT MARKINGS

Some of the required markings may be on a tag attached to the product.

RELATED PRODUCTS

Ground clamps covered under Grounding and Bonding Equipment (KDER) are also suitable for use in applications as specified in this category.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 467, “Grounding and Bonding Equipment.”

UL MARK

The Listing Mark of UL on the product, on a tag securely attached to the product or container, or on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Ground Clamp – Communication.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**GROUNDING EQUIPMENT, NEUTRAL
GROUNDING DEVICES, OVER 600
VOLTS (KDZC)****GENERAL**

This category covers neutral grounding devices intended for use on systems having ac voltage ratings from 601 V to 38 kV. Neutral grounding devices are used for the purpose of controlling the ground current or the potentials to ground of an alternating-current system.

These devices are grounding transformers, ground-fault neutralizers, resistors, reactors, capacitors, or a combination of these. In addition, these devices may include current sensors, relays, audible and visual signaling and similar accessories.

PRODUCT MARKINGS

Devices suitable for outdoor use are marked “Outdoor.”

Enclosures are marked to indicate the exposure category (A, B or C) for which they are intended. Enclosures marked “Category A” are intended to be installed in areas accessible to the unsupervised general public; enclosures marked “Category B” are intended to be installed in areas accessible to authorized personnel only; enclosures marked “Category C” are intended for use in areas accessible to qualified personnel only.

Devices covered under this category are marked with the following information: Name of manufacturer, serial number, name of device, type designation, impedance (except resistors), number of phases as applicable, rated current, rated frequency, rated time, rated voltage, BIL of line, indoor or outdoor service, weight, volume of oil (as applicable), instruction book number or equivalent.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/IEEE 32 (1972), “IEEE Standard Requirements, Terminology, and Test Procedure for Neutral Grounding Devices,” and ANSI/IEEE C37.20.3 (2001), “Metal-Enclosed Interrupter Switchgear.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Neutral Grounding Resistor” or “Neutral Grounding Reactor,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HEALTH CARE FACILITIES EQUIPMENT (KEVQ)**HEALTH CARE FACILITIES
EQUIPMENT (KEVQ)****GENERAL**

This category covers appliances, utilization equipment and construction materials which have been judged to be particularly applicable to a health care facility as defined by Article 517 of ANSI/NFPA 70, “National Electrical Code.”

The general information under the specific categories indicate the areas in which the individual Listings are intended to apply in health care facility installations.

This equipment, unless otherwise indicated, is for installation in unclassified (ordinary) areas of health care facilities.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**HOSPITAL GROUND JACKS AND
GROUNDING CORD ASSEMBLIES (KEVX)****USE**

This category covers hospital ground jacks and mating grounding cord assemblies intended for use in hospital rooms or other in health care facilities to connect equipment to a patient grounding point or other appropriate reference grounding point.

The visible face of a grounding jack is green.

PRODUCT MARKINGS

The cover of a hospital grounding jack having a twist-to-lock configuration is marked “Locked – for Grounding” or “Twist to Lock – for Grounding.”

RELATED PRODUCTS

General equipment for grounding and bonding is covered under Grounding and Bonding Equipment (KDER).

Equipment for grounding and bonding for telecommunication applications is covered under Grounding and Bonding Equipment, Communication (KDZH).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 467, “Grounding and Bonding Equipment.”

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Grounding Jack” or “Grounding Cord Assembly,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**ISOLATED POWER SYSTEMS EQUIPMENT
(KEVV)****GENERAL**

This category covers isolated power centers that incorporate complete assemblies of isolation transformers and one or more isolated secondary circuits terminated in integrally mounted grounding-type load receptacles in an overall enclosure, which are intended for use in health care facilities where it is considered desirable to minimize available leakage and short-circuit currents.

Line isolation monitors may be included in the assembly to indicate the “condition” of the isolated circuit and its connected components with respect to electrical ground.

Other distribution panels certified as isolated power panelboards incorporate the same features as described above except that they may be supplied with power from a separate isolation transformer. They are connected by an approved wiring method to remote receptacles located in operating rooms or other anesthetizing location areas of health care facilities.

This category also covers accessory equipment, such as terminal assemblies located in patient care areas.

Isolated Power Systems Equipment (KEWV)—Continued

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1047, "Isolated Power Systems Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Isolated Power Systems Equipment."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ISOLATED POWER WALL MODULES (KEXS)

GENERAL

This category covers isolated power wall modular sections for use in, within, or as part of health care facilities, and may be part of a building structure. They are designed for permanent connection to the building wiring in accordance with Article 517 of ANSI/NFPA 70, "National Electrical Code" (NEC).

These sections incorporate factory-installed wiring and equipment comprising part of an isolated power system such as the components of an isolated power center or an isolated power panelboard, or accessory equipment such as terminal assemblies located in patient care areas. In addition, they may incorporate various combinations of gas outlets, lighting fixtures, elapsed-time indicators, clocks, intercommunication equipment, etc.

These sections do not contain any grounded power systems except those necessary for connection to the primary of an isolating transformer, if provided. Sections intended for use with grounded power systems are covered under Sections and Units (QQXX).

The pre-installed components and wiring of a prefabricated section may be concealed and, except for the branch-circuit connections, may not be accessible for inspection at the inspection site.

The isolated power wall module sections have not been investigated to determine conformance with one or more model building or plumbing codes. They have been investigated to determine compliance with the NEC. These wall modular sections are intended for installation subject to approval by the Authority Having Jurisdiction.

The maximum available leakage current to the enclosure and primary grounded circuit conductor from either isolated circuit conductor has been investigated to determine that it is less than 100 microamperes with no loads connected to the isolated circuit.

Fire hazard classification of the building materials used in the wall module sections, including the resistance of any plywood to delamination under fire exposure, has been investigated. The fire hazard classification of the building materials used in prefabricated assemblies has the following maximum ratings applied to the finished panel and to core material (if used) in comparison with asbestos cement boards as zero and untreated red oak lumber as 100:

- Flame-spread rating 75
- Smoke-developed rating 200

RELATED PRODUCTS

See Isolated Power Systems Equipment (KEWV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1047, "Isolated Power Systems Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Isolated Power Wall Module."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Isolated Power Wall Modules (KEXS)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PREFABRICATED MEDICAL HEADWALLS AND MEDICAL SUPPLY UNITS (KEZR)

USE

This category covers prefabricated medical headwalls and medical supply units that are factory-built assemblies for use in, within, or part of health care facilities, and may be part of a building structure. These assemblies may incorporate pre-installed materials and certified equipment which is usually concealed and may not be accessible for inspection at the installation site. The certified equipment incorporated in these assemblies includes, but is not limited to, receptacles, switches, clocks, timing devices, patient monitors, vacuum stations and gas fittings.

These assemblies, including any field wiring for units that are not factory wired, are intended for installation subject to approval by the Authority Having Jurisdiction.

INSTALLATION CODES

Materials, including the methods used for the installation of electrical, mechanical, heating, and plumbing equipment included in these assemblies by the manufacturer of the assemblies, have been judged under UL requirements which are based on the National Electrical Code, National Fire Code, and Model Building, Plumbing and Mechanical Codes.

RATINGS

The fire hazard of building materials employed in the assemblies is judged to be no greater than that of ordinary lumber used in site-constructed buildings. Finished surfaces are of materials having flame-spread and smoke-developed ratings of 200 or less. Products with a rating less than 200 indicated in the individual certifications may be included as part of the product marking.

Structural requirements vary with type of building construction and occupancy, and stability is to a large measure dependent upon the attachment of the assemblies to field-erected or existing structures. Therefore, Authorities Having Jurisdiction should be consulted with respect to local requirements.

RELATED EQUIPMENT

Prefabricated assemblies for use in locations other than health care facilities are covered under Prefabricated Assemblies, Sections and Units (QQXX) and Wiring Assemblies (QQYZ).

ADDITIONAL INFORMATION

For additional information, see Health Care Facilities Equipment (KEVQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in ANSI/NFPA 70, "National Electrical Code."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name, such as "Medical Headwall," "Medical Supply Unit," "Dental Unit," or proprietary descriptive product name with further description where necessary.

One Listing Mark is applied to each assembly.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MEDICAL WASTE DISPOSAL SYSTEMS, EQUIPMENT AND ACCESSORIES (KFCC)

GENERAL

This category covers products that neutralize or collect biological or medical waste as indicated by the manufacturer. These products are intended for use in hospitals, nursing homes, medical care centers, medical and dental offices, and similar professional health care facilities. They include, but are not limited to syringe destroyers, waste disposers and similar equipment.

Approval to market these products in the United States is regulated by the Federal Food, Drug, and Cosmetic Act, P.L.94-295, and the code of Federal Regulations, Title 21, Parts 800-895. UL's investigation is, therefore, limited to Classification as to electrical shock, fire and mechanical hazards only. The environmental impact and health aspects associated with the use of these products and their ability to collect, identify, or neu-

Medical Waste Disposal Systems, Equipment and Accessories (KFCC)—Continued

tralize biological and medical waste have not been investigated. This limitation is specified in the instruction manual for all products covered under this category.

Unless otherwise noted, these products have not been investigated for use in the presence of flammable materials. Equipment which has been investigated to determine its suitability for use in hazardous (classified) locations as defined by ANSI/NFPA 70, "National Electrical Code," may be found in UL's Hazardous Locations Equipment Directory.

ADDITIONAL INFORMATION

For additional information, see Health Care Facilities Equipment (KEVQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 61010A-1, "Electrical Equipment for Laboratory Use: Part 1: General Requirements," and ANSI/UL 430, "Waste Disposers."

Equipment for use in patient environments as defined in IEC 60601-1-1, "Medical Electrical Equipment, Part 1: General Requirements for safety, 1. Collateral standard: Safety requirements for medical electrical systems" is also investigated to applicable requirements in UL 2601-1, "Medical Electrical Equipment, Part 1: General Requirements for Safety."

Equipment intended for household use is also investigated to the applicable requirements in UL 1431, "Personal Hygiene and Health Care Appliances."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY]

AS TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

POWER SUPPLIES FOR USE IN HEALTH CARE FACILITIES (KFCG)

USE

This category covers indoor-use power supplies having input ratings not more than 600 V, direct and alternating current, intended for use with professional medical and dental equipment in ordinary locations of health care facilities in accordance with ANSI/NFPA 70, "National Electrical Code."

Power supplies not provided with standard output receptacles are marked for use with the intended end-use equipment, the combination of which has been investigated for compliance with the relevant standards of this category as noted below. Consideration should be given for the combination of products to be investigated under Medical Equipment (PIDF).

REBUILT PRODUCTS

This category also covers power supplies that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new power supplies.

FACTORS NOT INVESTIGATED

These products have not been investigated for the effects they may have on the systems or the equipment to which they are connected.

RELATED PRODUCTS

Power supplies not provided with standard output receptacles and not marked for use with intended end-use equipment are covered under Power Supplies, Medical and Dental (QQHM2).

Power supplies intended to isolate the secondary output from ground are covered under Isolated Power Systems Equipment (KEWV).

ADDITIONAL INFORMATION

For additional information, see Health Care Facilities Equipment (KEVQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1012, "Power Units Other Than Class 2," and UL 544, "Medical and Dental Equipment," or UL 60601-1, "Medical Electrical Equipment, Part 1: General Requirements for Safety."

Some certifications are based on UL 544 or UL 2601-1, "Medical Electrical Equipment, Part 1: General Requirements for Safety," instead of UL 60601-1.

Power Supplies for Use in Health Care Facilities (KFCG)—Continued

UL 2601-1 (2nd edition) is identical in content to UL 60601-1 (1st edition). Certifications based on UL 544 will be withdrawn as of January 1, 2010.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Supply," "Power Conditioner," etc., preceded by "Hospital," "Health Care Facility," "Medical" or "Dental," as appropriate.

For rebuilt products, the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TELEVISION/VIDEO EQUIPMENT FOR USE IN HEALTH CARE FACILITIES (KFCV)

GENERAL

This category covers power-operated television and video equipment intended for entertainment purposes in unclassified locations of health care facilities. Equipment suitable for use in oxygen-enriched atmospheres is so indicated in the individual certifications.

Entertainment centers consisting of combinations of a television receiver and a radio receiver and/or other audio or video equipment are investigated to the requirements for television equipment.

This category also covers accessory equipment, including carts, stands, supporting arms and/or wall-mounting brackets, intended for use with television and video equipment in health care facilities.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1492, "Audio-Video Products and Accessories," or UL 6500, "Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use," or ANSI/UL 60065, "Audio, Video and Similar Electronic Apparatus – Safety Requirements."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "TV," "TV Stand," etc., preceded by "Hospital" or "Health Care Facility."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

UNINTERRUPTIBLE POWER SUPPLIES FOR USE IN HEALTH CARE FACILITIES (KFFG)

USE

This category covers indoor-use uninterruptible power supplies that may be portable, stationary or fixed. The equipment is rated not more than 600 V ac, and is intended for use with professional medical and dental equipment in health care facilities in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

An uninterruptible power supply is used to provide alternating-current power to a load for a period of time marked on the unit in the event of a utility power failure. In addition, it may provide a more constant voltage and frequency supply to the load, reducing the effects of utility voltage and frequency variations.

Uninterruptible power supplies provided with nonstandard output receptacles are marked for use with the intended end-use equipment.

Unless marked "Essential Electrical System," these uninterruptible power supplies have not been investigated with respect to the requirements for essential electrical systems as defined in Article 517 of the NEC.

REBUILT PRODUCTS

This category also covers uninterruptible power supplies that are rebuilt by the original manufacturer or another party having the necessary facilities.

HEALTH CARE FACILITIES EQUIPMENT (KEVQ)

Uninterruptible Power Supplies for Use in Health Care Facilities (KFFG)—Continued

ties, technical knowledge and manufacturing skills. Rebuilt uninterruptible power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt uninterruptible power supplies are subject to the same requirements as new uninterruptible power supplies.

FACTORS NOT INVESTIGATED

The investigation of a product covered under this category does not include the effects it may have on the system or equipment to which it is connected.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1778, "Uninterruptible Power Supply Equipment," and UL 60601-1, "Medical Electrical Equipment, Part 1: General Requirements for Safety."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Uninterruptible Power Supply," preceded by "Hospital," "Health Care Facility," "Medical" or "Dental," as appropriate.

For rebuilt products, the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

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HEATERS FOR USE IN HAZARDOUS LOCATIONS (KFHT)

HEATERS, AIR FOR USE IN HAZARDOUS LOCATIONS (KFVR)

GENERAL

This category covers air heaters of the natural convection, radiant heating, and fan-assisted types. Heaters for surface mounting are intended to be installed in a horizontal position and should not be recessed, obstructed, or placed on or under shelves. Installation is intended to be in accordance with the instructions furnished with the heater.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 823, "Electric Heaters for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Air Heater for Hazardous Location."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRICAL RESISTANCE HEAT TRACING CABLE SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (KGFR)

USE

This category covers heat tracing cable systems intended for pipe line or vessel heat tracing. A heat tracing system is composed of heat tracing cable and connection kits, which are used for connecting power, connect-

HEATERS FOR USE IN HAZARDOUS LOCATIONS (KFHT)

Electrical Resistance Heat Tracing Cable Systems for Use in Hazardous Locations (KGFR)—Continued

ing multiple heat tracing cables, terminating cables or other product specific uses as described in the individual certifications.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 515, "Electrical Resistance Heat Tracing for Commercial and Industrial Applications."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Heat Tracing Cable Set for Use in Hazardous Locations" or "Heat Tracing Cable System for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HEATERS, INDUSTRIAL AND LABORATORY FOR USE IN HAZARDOUS LOCATIONS (KGIZ)

GENERAL

This category covers paint heaters, ovens, hot plates, and other types of heaters as described in the individual certifications.

In cases where the nature or construction of the equipment is such that special precautions beyond the requirements of ANSI/NFPA 70, "National Electrical Code," must be observed in installation or use, the necessary instructions are marked on the equipment.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 823, "Electric Heaters for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial and Laboratory Heater for Use in Hazardous Locations," "Industrial Heater for Use in Hazardous Locations" or "Laboratory Heater for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HEATERS, MISCELLANEOUS FOR USE IN HAZARDOUS LOCATIONS (KGWX)

GENERAL

This category covers miscellaneous heaters, including immersion heaters, motor-enclosure space heaters, and heaters for compressed air and water hose reels.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 823, "Electric Heaters for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as

PRODUCT CATEGORIES BY CATEGORY CODE

230 HEATERS FOR USE IN HAZARDOUS LOCATIONS (KFHT)

Heaters, Miscellaneous for Use in Hazardous Locations (KGWX)—Continued

illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Heater for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings. The words "Hazardous Locations" may be abbreviated "Haz. Loc."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SURFACE HEATERS FOR USE IN HAZARDOUS LOCATIONS (KHCM)

USE

This category covers surface heaters intended for pipeline or vessel heating.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 515, "Electrical Resistance Heat Tracing for Commercial and Industrial Applications."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Surface Heater for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HEATERS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (KHTG)

ELECTRICAL RESISTANCE HEAT TRACING CABLE SYSTEMS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (KIHP)

USE

This category covers heat tracing cable systems intended for pipe line or vessel heat tracing. A heat tracing system is composed of heat tracing cable and connection kits, which are used for connecting power, connecting multiple heat tracing cables, terminating cables or other product specific uses as described in the individual certifications.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 515, "Electrical Resistance Heat Tracing for Commercial and Industrial Applications."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Heat Tracing Cable Set for Use in Hazardous Locations" or "Heat Tracing Cable System for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

HEATERS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (KHTG)

Electrical Resistance Heat Tracing Cable Systems for Use in Zone Classified Hazardous Locations (KIHP)—Continued

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HEATERS, INDUSTRIAL AND LABORATORY FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (KIQU)

GENERAL

This category covers paint heaters, ovens, hot plates, and other types of heaters as described in the individual certifications.

INSTALLATION

In cases where the nature or construction of the equipment is such that special precautions beyond the requirements of ANSI/NFPA 70, "National Electrical Code," must be observed in installation or use, the necessary instructions are marked on the equipment.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 499, "Electric Heating Appliances."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial and Laboratory Heater for Use in Hazardous Locations," "Industrial Heater for Use in Hazardous Locations," or "Laboratory Heater for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HEATERS AND HEATING EQUIPMENT (KKBV)

This category covers equipment rated up to 600 V intended for household, industrial or commercial installations.

These products have not been investigated for outdoor use unless they are marked "For Outdoor Use" or the equivalent, in which case they are acceptable for both outdoor and indoor use.

AIR HEATERS, MOVABLE AND WALL OR CEILING HUNG (KKPT)

USE AND INSTALLATION

This category covers cord-and-plug-connected air heaters of the natural convection and fan-assisted movable types, wall-hung (other than at the baseboard level), and ceiling-hung types.

Movable and wall- or ceiling-hung heaters are intended to act as sources of heat for the purpose of raising or maintaining the comfort level in a desired area.

Some movable and wall- or ceiling-hung heaters may present fire hazards if they come in contact with combustible materials, such as draperies, furniture, carpeting, bedding and the like, or if they are covered or blocked in any manner. In accordance with product markings and instructions for the user, such heaters should be placed so as to provide safeguards against such contact and should not be located where they can be covered or blocked, for example, at the baseboard level. Use that does not result in a fire hazard may still cause discoloration or scorching (but no glowing embers or flaming) of adjacent materials.

Certain air heaters subjected to the equivalent of a beating rain are considered to be acceptable for outdoor installation and are marked "Outdoor Use."

Air Heaters, Movable and Wall or Ceiling Hung (KKPT)—Continued

RELATED PRODUCTS

Fixed and location-dedicated electric room heaters are covered under Air Heaters, Room, Fixed and Location Dedicated (KKWS).

Permanently-mounted heaters having provisions for drawing in outside air are certified as room fan heater units under Heating and Cooling Equipment (LZFE).

Portable baseboard heaters and accessories are covered under Baseboard Heaters (KLDR) and Baseboard Heater Accessories (KLQZ), respectively.

These heaters have not been investigated for their acceptability when used in confined areas and operated at elevated temperatures for heat treatment or steam and dry-bath applications. Steam and dry-bath units are covered under Steam Bath Equipment (KQBZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1278, "Movable and Wall- or Ceiling-Hung Electric Room Heaters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Movable Heater," "Movable Fan Type Heater," "Wall-Hung Heater," "Ceiling-Hung Heater," "Wall- or Ceiling-Hung Heater," "Movable Radiant Glass Heater," "Movable Floor Mounted Air Heater," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AIR HEATERS, ROOM, FIXED AND LOCATION DEDICATED (KKWS)

USE AND INSTALLATION

This category covers electric air heaters of the fixed and location-dedicated room type for residential, commercial and industrial applications. These heaters are of the radiant, natural convection and fan-assisted types intended for mounting in various positions, such as on or in a wall, (except at the baseboard level), on, in or suspended from a ceiling or inserted in a floor. Combination units that include lights have been investigated with regard to their suitability for use as fixtures. Commercial-industrial types include heaters intended to be suspended from a ceiling or wall, or to provide an air curtain in a doorway.

These air heaters are intended to act as sources of heat for the purpose of raising or maintaining the comfort level in a desired area. These units have not been investigated for their acceptability when installed in confined areas and operated at elevated temperatures for heat treatment or steam and dry-bath applications.

Some air heaters may present fire hazards if they come in contact with combustible materials, such as draperies, furniture, carpeting, bedding and the like, or if they are covered or blocked in any manner. Such heaters are intended to be installed as to provide safeguards against such contact and should not be located where they can be covered or blocked, for example, at the baseboard level. Installations that do not result in a fire hazard may still cause discoloration or scorching (but no glowing embers or flaming) of adjacent materials.

Certain room heaters have been investigated for outdoor use and are marked accordingly. All other heaters have been investigated for indoor installation only. The acceptability of such heaters when installed in semi-protected or otherwise shielded locations is determined by the Authority Having Jurisdiction.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of ANSI/NFPA 70, "National Electrical Code," must be observed in installation or use, suitable warnings and necessary special instructions are marked on the equipment.

RELATED PRODUCTS

Movable and wall- or ceiling-hung heaters are covered under Air Heaters, Movable and Wall or Ceiling Hung (KKPT).

Heaters having provisions for drawing in outside air are certified as room fan heater units under Heating and Cooling Equipment (LZFE).

Portable baseboard heaters and accessories are covered under Baseboard Heaters (KLDR) and Baseboard Heater Accessories (KLQZ), respectively.

Air Heaters, Room, Fixed and Location Dedicated (KKWS)—Continued

Steam and dry-bath units are covered under Steam Bath Equipment (KQBZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2021, "Fixed and Location-Dedicated Electric Room Heaters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Room Heater," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BASEBOARD HEATERS (KLDR)

USE AND INSTALLATION

This category covers space heaters of the portable and permanently mounted types intended to be positioned or installed on or in the wall at the baseboard level, or on the floor.

Baseboard heaters have been investigated and found to incorporate suitable safeguards against establishment of fire hazards that might result from contact with draperies, furniture, carpeting, bedding and the like; however, discoloration or scorching (but no glowing embers or flaming) may result on adjacent materials.

Heaters, other than those marked to indicate that they are not for residential use, have been investigated to determine that the accessible surface temperatures are low enough to reduce the likelihood of burns from accidental contact.

Electrical cords, drapes, and other furnishings should be kept away from baseboard heaters. To reduce the likelihood of cords contacting the heater, the heater should not be located beneath electrical receptacles. Receptacle accessories for use with individual manufacturers' baseboard heaters are covered under Baseboard Heater Accessories (KLQZ).

Baseboard-mounted equipment consists of two types: (1) Complete units intended for individual mounting in specific locations, and (2) complete systems, which include accessories to enable the heating units to be interconnected around the perimeter of a room (see KLQZ). With reference to these systems, each manufacturer is required to furnish detailed instructions covering the assembly of the basic units and accessories, and indicating the method in which ground continuity is intended to be maintained between adjacent sections.

Electrical fittings are provided with each heater of a system to ensure ground continuity between adjacent units and to protect interconnecting wiring, unless investigation shows that standard fittings that are available in the field will accomplish the same result.

A system which is factory furnished with all interconnecting wiring, fittings, raceways, etc., to complete the installation is considered suitable for connection to a single-outlet branch circuit.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1042, "Electric Baseboard Heating Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Baseboard Heater."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PRODUCT CATEGORIES BY CATEGORY CODE

Baseboard Heater Accessories (KLQZ)**USE AND INSTALLATION**

This category covers accessories intended to be used in conjunction with individual manufacturers' certified baseboard heater systems (see KLDR). Accessories include wiring components for interconnection of individual units, corner, blank and filler sections, to facilitate perimeter installation, temperature-regulating components and other general- and special-use receptacle and switch components to be mounted in line with baseboard heater installations.

Attachment plug receptacle sections of baseboard heating systems provided for installation, together with the other components of baseboard air heating systems, are intended to be supplied by means of conventional wiring methods from separate branch circuits not interconnected with the heating system.

Combination transfer switch-receptacle sections of baseboard heating systems which permit use of either the heating system by itself, or a separate room air conditioner by itself, are intended to be connected to a single branch circuit of appropriate size.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1042, "Electric Baseboard Heating Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Baseboard Heater Accessory."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CLOTHES DRYERS (KMEX)**USE AND INSTALLATION**

This category covers clothes dryers intended for use only where water has been used as the cleaning agent. Unless specifically marked or indicated in the installation instructions, the clothes dryers are intended for freestanding installation with no spacing required between the back and any side to combustible wall surfaces, but are not intended to be operated in closets, alcoves, or other confined areas, nor stacking one unit above another.

A wall-insert clothes dryer is intended to be mounted permanently in a wall or other vertical surface of a building, or in a cabinet. A wall-insert clothes dryer is suitable for installation as a recessed clothes dryer, or as a freestanding clothes dryer.

A recessed clothes dryer is intended to (1) be supported by the floor, (2) rest against a wall in the rear, (3) rest against a wall, a cabinet, or another appliance on one side, and (4) rest against a cabinet or other appliance on the other side. If the design permits, a countertop may cover the clothes dryer and the adjacent cabinets and appliances. A recessed clothes dryer is not intended for permanent attachment to the building structure or to adjacent cabinets or appliances. A recessed clothes dryer is suitable for installation as a freestanding clothes dryer.

A clothes dryer intended to be installed in a closet should be installed in accordance with the marked required clearances to all adjacent surfaces and the required ventilation in the door.

Clothes dryers are provided with means of connection of the metallic parts of the enclosure to ground, and all clothes dryers intended for nominal 120-240 V three-wire operation may be provided with grounding facilities to permit the frame of the appliance to be connected directly to the neutral conductor in accordance with the provisions of ANSI/NFPA 70, "National Electrical Code" (NEC).

Motor-overcurrent protection is included in motor-operated dryers if adequate protection would not be provided by branch circuits to which they would properly be connected.

Clothes dryers, other than condenser-type clothes dryers, are intended to be connected to a clothes dryer exhaust duct to the outdoors. The maximum duct length and number of bends is intended to be in accordance with the clothes dryer installation instructions.

The operation of condenser-type clothes dryers is such that air from the heater of the dryer is circulated across the clothes and then across a condenser. The condenser transforms the vapor to water, which collects in a reservoir in the clothes dryer. As the vapor changes to a liquid, it carries the lint with it to an internal reservoir. The air that passes across the condenser then recirculates across the heater in the clothes dryer in a continuous

Clothes Dryers (KMEX)—Continued

operation until the clothes are dry. There is no venting of moisture/lint-laden air to the outside. All moisture/lint-laden air is continuously recirculated.

Provision should be made for the periodic removal of accumulation of lint that results from normal operation of this type of equipment.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, the necessary special instructions are provided on or with the equipment. An individual branch circuit should be provided for each clothes dryer.

Certified clothes dryer transition ducts may be used to connect the clothes dryer to an existing permanent duct system provided as part of the building structure. certified clothes dryer ducts are covered under Clothes Dryer Transition Ducts (KMIK).

The burglary- and theft-protection features of coin-operated machines have not been investigated, unless specifically indicated by a marking on the machine.

RELATED PRODUCTS

For dryers other than electrically heated types, see Dryers (LEFZ), Gas-fired Clothes Dryers, Type 1 (LETA) and Gas-fired Clothes Dryers, Type 2 (LETX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 2158, "Electric Clothes Dryers," and ANSI/UL 1240, "Electric Commercial Clothes-Drying Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Clothes Dryer."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Clothes Dryer Transition Ducts (KMIK)**USE**

This category covers clothes dryer transition ducts intended for venting the exhaust air of electric and gas clothes dryers of household or commercial type.

These ducts are rigid or flexible metal types. Flexible types are a maximum 8 ft. long for use in single lengths only. These ducts are intended for use only in connecting a clothes dryer to permanent ducting provided as a part of the building structure.

These ducts are intended for installation in accordance with the installation instructions provided with the product.

ADDITIONAL INFORMATION

For additional information, see Clothes Dryers (KMEX), Heaters and Heating Equipment (KKBV), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2158A, "Outline of Investigation for Clothes Dryer Transition Ducts."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Clothes Dryer Transition Duct."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CONTROL PANELS, REMOTE, FOR ELECTRIC DUCT HEATERS (KMLW)

USE AND INSTALLATION

This category covers electrical panels incorporating control and/or overcurrent protective devices intended specifically for remote use with electric duct heaters. Overcurrent protective devices in these panels are intended to provide overcurrent protection in accordance with Section 424.22(C) of ANSI/NFPA 70, "National Electrical Code."

Unless otherwise specified in the manufacturer's installation instructions, these panels are intended to be mounted remote from the electric duct heaters, in a location where they will not be affected by heat or condensation from operation of the equipment.

The proper installation of these panels requires careful consideration of the individual manufacturer's installation instructions and wiring diagrams.

General-purpose panels are not limited to use with specific makes and models of electric duct heaters. These panels are provided with installation instructions and wiring diagrams showing supply connections, connections to the electric duct heaters, and control circuit connections to be completed at the time of installation.

Panels intended to be used only with specific certified equipment is so identified and the equipment marked to require the particular panel. The installation instructions and wiring diagrams for these panels may be provided with the panel or may be provided only with the certified electric duct heaters.

RELATED PRODUCTS

General-purpose panels containing only overcurrent protective devices or only magnetically-operated switching devices are covered under Panels (QEUY) and Switches, Industrial Control (NRNJ), respectively.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1996, "Electric Duct Heaters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "General Purpose Control Panel for Electric Space Heating Equipment" or "Control Panel for Specific Electric Space Heating Equipment — See equipment nameplate and installation instructions."

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HEATERS, COOKING APPLIANCES (KMSV)

Commercial Cooking Appliances (KNGT)

USE AND INSTALLATION

This category covers cooking equipment intended for commercial indoor use, such as coffee machines, espresso coffee makers (single or grouped dispensers), conductive cookers, food warmers including heated food servers, fryers, griddles, nut warmers, ovens, popcorn machines, steam kettles, ranges, and other appliances for use in commercial kitchens, restaurants, or other business establishments where food is dispensed.

This category also covers custom-built food preparation and/or serving equipment consisting of drop-in components, shelf heaters, plate warmers, lighted and/or heated food displays, etc.

These appliances are intended for commercial use in unclassified (ordinary) locations in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), and are intended to be installed in accordance with ANSI/NFPA 96, "Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations."

Commercial cooking appliances of certain types are designed for permanent connection to water supply and sewer lines at the point of installation. Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

If a product is suitable for built-in installation, side-by-side mounting or stacking, it is indicated in the installation instructions.

Commercial Cooking Appliances (KNGT)—Continued

Certain appliances covered under this category have also been investigated for use aboard marine vessels over 65 ft in length as covered by USCG, Electrical Engineering Regulations Subchapter J, CG-259, (46 CFR Parts 110-113). Such appliances are identified by UL's Marine Listing Mark.

REBUILT PRODUCTS

This category also covers commercial cooking equipment that is rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt commercial cooking equipment is rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt commercial cooking equipment is subject to the same requirements as new commercial cooking equipment.

PRODUCT MARKINGS

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, suitable warnings or special instructions are marked on the equipment.

Appliances covered under this category are suitable for wiring with either copper or aluminum power supply conductors, unless marked "Use Copper Wire Only For Power Supply Connections."

RELATED PRODUCTS

For similar types of gas-fired food service equipment intended for commercial use, see Gas-fired Food Service Equipment (LGQX).

For cooking oil filters that are not an integral part of another appliance, see Filters for Cooking Oil, Commercial (KNRF).

Appliances provided with integral ventilation or recirculating equipment have been investigated to the requirements contained in UL 710B, "Recirculating Systems," and are covered under Commercial Cooking Equipment with Integral Recirculating Ventilation Systems (KNKG).

ADDITIONAL INFORMATION

For additional information, see Heaters and Heating Equipment (KKBV), Electrical Equipment for Use in Ordinary Locations (AALZ), and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 197, "Commercial Electric Cooking Appliances."

Appliances with an integral cooking oil filter have been additionally investigated to ANSI/UL 1889, "Commercial Filters for Cooking Oil."

ADJUNCT SERVICE

UL provides a service for the Classification of commercial cooking appliances that not only meet the appropriate requirements of UL but also have been investigated in accordance with NSF/ANSI 4, "Commercial Cooking, Rethermalization and Powered Hot Food Holding and Transport Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Cooking Appliance" or "Cooking Appliance," or other appropriate product name as shown in the individual Listings.

For rebuilt products the word "Rebuilt," "Refurbished" or "Remanufactured" precedes the product name.

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated to NSF/ANSI 4. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above, the EPH Mark, and the text "ANSI/NSF 4." The EPH Mark includes, within a triangle, the UL symbol, the word "CLASSIFIED" above the UL symbol, and the letters "EPH" below the UL symbol.

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Commercial Cooking Appliance Assemblies Classified for Use with Other Manufacturers' Appliances (KNJA)

USE AND INSTALLATION

This category covers commercial cooking appliance assemblies intended for retrofit installation on other manufacturers' certified commercial cooking appliances.

The devices consist of a controller assembly that is designed for use with a specific manufacturer and model of a commercial cooking appliance.

PRODUCT MARKINGS

Commercial Cooking Appliance Assemblies Classified for Use with Other Manufacturers' Appliances (KNJA)—Continued

The markings on and the literature provided with the controller indicate the specific end-use appliance for which it is intended to be used.

FACTORS NOT INVESTIGATED

The operation of the appliance utilizing these controllers is intended to be identical to the operation with the factory-supplied control; however, any programming functions that vary from the original control have not been investigated.

RELATED PRODUCTS

See Commercial Cooking Appliances (KNGT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 197, "Commercial Electric Cooking Appliances."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

COMMERCIAL COOKING APPLIANCE CONTROLLER

FOR USE WITH UL LISTED [MANUFACTURER'S NAME AND MODEL NUMBER(S)]

COMMERCIAL COOKING APPLIANCE(S)

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Commercial Cooking Appliances with Integral Recirculating Ventilation Systems (KNKG)**USE AND INSTALLATION**

This category covers cooking equipment intended for commercial use, such as deep fat fryers, griddles and other appliances for use in commercial kitchens, restaurants, or other business establishments where food is prepared. Each appliance covered in this category is manufactured with an integral recirculating ventilation system.

The integral recirculating ventilation systems of these appliances consist of a fan, collection hood, and an air filtering system consisting of a grease filter, and may also incorporate other air filtering devices. These systems incorporate an automatic fire extinguisher unit which has been investigated with the cooking equipment section.

Integral recirculating ventilation systems are intended for venting captured and filtered air back into the room in which the equipment is located. These products are not intended for connection to a ducted exhaust system.

These appliances are intended for commercial use in unclassified (ordinary) locations in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), and are intended to be installed in accordance with NFPA 96, "Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations."

Commercial cooking appliances of certain types are designed for permanent connection to water supply and sewer lines at the point of installation. Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

PRODUCT MARKINGS

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, suitable warning or special instructions are marked on the equipment.

Appliances covered under this category are suitable for wiring with either copper or aluminum power supply conductors, unless marked "Use Copper Wire Only For Power Supply Connections."

UNEVALUATED FACTORS

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared by use of these appliances has been investigated.

RELATED PRODUCTS

For products that are intended for installation with ducts, see Exhaust Hoods with Exhaust Dampers (YXZR) and Exhaust Hoods Without Exhaust Dampers (YYCW).

Recirculating systems which are separated from commercial cooking appliances are covered under Hoods, Recirculating Systems, for Use with Specified Commercial Cooking Appliances (YZCT).

Commercial Cooking Appliances with Integral Recirculating Ventilation Systems (KNKG)—Continued

For cooking oil filters that are not an integral part of another appliance, see Filters for Cooking Oil, Commercial (KNRF).

ADDITIONAL INFORMATION

For additional information, see Heaters and Heating Equipment (KKBV), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 197, "Commercial Electric Cooking Appliances."

Commercial cooking appliances with integral recirculating ventilation systems are additionally investigated to UL 710B, "Recirculating Systems."

Appliances with an integral cooking oil filter have been additionally investigated to ANSI/UL 1889, "Commercial Filters for Cooking Oil."

ADJUNCT SERVICE

UL provides a service for the Classification of commercial cooking appliances with integral recirculating ventilation systems that not only meet the appropriate requirements of UL but also have been investigated in accordance with NSF/ANSI 4, "Commercial Cooking, Rethermalization and Powdered Hot Food Holding and Transport Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Cooking Appliance" or "Cooking Appliance," or other appropriate product name as shown in the individual Listings, together with the words "With Integral Recirculating Ventilation System" or "With Ductless Hood."

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated to NSF/ANSI 4. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above, the EPH Mark, and the text "ANSI/NSF 4." The EPH Mark includes, within a triangle, the UL symbol, the word "CLASSIFIED" above the UL symbol, and the letters "EPH" below the UL symbol.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Commercial Cooking Appliances with Integral Systems for Limiting the Emission of Grease-laden Air (KNLZ)**USE AND INSTALLATION**

This category covers cooking equipment intended for commercial use, such as pressurized deep fat fryers and other appliances for use in commercial kitchens, restaurants or other business establishments where food is prepared. Each appliance covered under this category is manufactured with an integral system feature to limit the emission of grease-laden air from the cooking process to the room ambient.

These appliances have been investigated for the limit of 5 mg/m³ for the emission of grease-laden air to the room ambient in accordance with the recommendations of ANSI/NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," using the EPA-202 test method prescribed for cooking appliances provided with integral recirculating air systems.

These products are not intended for connection to a ducted exhaust system.

Appliances in this category are not provided with an integral fire extinguishing system. Authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to fire extinguishing systems, such as the need for field installed systems in accordance with ANSI/NFPA 96.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of ANSI/NFPA 70, "National Electrical Code," must be observed in installations or use, suitable warning or special instructions are marked on the equipment.

Appliances covered under this category are suitable for wiring with either copper or aluminum power-supply conductors unless marked "Use Copper Wire Only For Power Supply Connections."

Commercial cooking appliances of certain types are designed for permanent connections to water supply and sewer lines at the point of installation. Authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

FACTORS NOT INVESTIGATED

Commercial Cooking Appliances with Integral Systems for Limiting the Emission of Grease-laden Air (KNLZ)—Continued

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared by use of these appliances has been investigated.

RELATED PRODUCTS

For products with integral recirculating systems including fire extinguishing systems, see Commercial, with Integral Recirculating Systems (KNKG).

For cooking oil filters that are not an integral part of another appliance, see Commercial Filters for Cooking Oil (KNRF).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 197, "Commercial Electric Cooking Appliances."

Appliances covered under this category with an integral cooking oil filter have been additionally investigated to ANSI/UL 1889, "Commercial Filters for Cooking Oil."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Cooking Appliance" or "Cooking Appliance," or other appropriate product name as shown in the individual Listings, together with the words "with integral system for limiting the emission of grease-laden air."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Custom-built Food Service Equipment (KNNS)**GENERAL**

This category covers custom-built commercial food serving and/or cooking equipment that includes various combinations of electric broilers, food warmers including heated food servers, fryers, griddles, ranges, ovens, lighted and/or heated food displays, shelf heaters, plate warmers, convenience receptacles, and the like. It may also include refrigerated beverage cooler/dispensers, drinking water coolers, freezers, ice makers, ice cream makers, refrigerators, soda fountain units, and the like.

INSTALLATION

Custom-built food service equipment has been evaluated for installation in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), and the recommendations of ANSI/NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations."

Certain types of custom-built food service equipment are designed for permanent connections to water supply and sewer lines at the point of installation. Authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

INSTALLATION INSTRUCTIONS

Custom-built food service equipment of such size that shipment in one carton or fully assembled is impractical, may be divided into sections. Each section may bear a "Custom-built Food Service Equipment Section" Certification Mark and is marked "Section ____ of ____." The first blank space is filled with the number of the section. The second blank space is filled with a number indicating the total number of custom-built food service equipment sections that constitute the complete custom-built food service equipment. The custom-built food service equipment has installation instructions describing or illustrating the proper assembly, mounting and connection of the numbered custom-built food service equipment sections. The acceptability of the assembly of the sections in the field rests with the Authority Having Jurisdiction.

PRODUCT MARKINGS

This equipment includes factory-built assemblies incorporating pre-installed materials and components which after installation are usually concealed and may not be accessible for inspection at the installation site. Electrical connections made during installation, other than supply connections, are identified by markings on the product.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, suitable warnings or special instructions are marked on the equipment.

Custom-built Food Service Equipment (KNNS)—Continued

Equipment in this category is suitable for wiring with either copper or aluminum power-supply conductors unless marked "Use copper wire only for power supply connections."

FACTORS NOT INVESTIGATED

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared or served by use of this equipment has been investigated.

RELATED PRODUCTS

For cooking-oil filters that are not an integral part of another appliance, see Commercial Filters for Cooking Oil (KNRF).

For refrigerated food service equipment without food heating functions, see Refrigeration Equipment (SCER).

For gas-fired food service equipment intended for commercial use, see Gas-fired Food Service Equipment (LGQX).

ADDITIONAL INFORMATION

For additional information, see Heaters and Heating Equipment (KKBV), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 197, "Commercial Electric Cooking Appliances," and ANSI/UL 471, "Commercial Refrigerators and Freezers."

Appliances in this category with an integral cooking oil filter have been additionally investigated to the requirements in ANSI/UL 1889, "Commercial Filters for Cooking Oil."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Custom-built Food Service Equipment" or "Custom-built Food Service Equipment Section," or other appropriate product name related to commercial preparation/serving of food such as "Food Kiosk" or "Food Service Work Table."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Filters for Cooking Oil, Commercial (KNRF)**GENERAL**

This category covers cooking-oil filters rated 600 V or less, intended for commercial use. This category covers portable filters and fixed filters whether intended for use with specific fryers or for general use.

These appliances filter the cooking oil used in deep-fat fryers usually found in commercial kitchens, restaurants, or other business establishments where food is prepared. They include a pump and may include an integral oil heater.

Filters suitable for built-in installation, side-by-side mounting or stacking are indicated in the installation instructions for the filter.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of ANSI/NFPA 70, "National Electrical Code," must be observed in installation or use, suitable warnings or special instructions are marked on the equipment.

These appliances are suitable for wiring with either copper or aluminum power-supply conductors unless marked "Use copper wire only for power supply connections" or the equivalent.

FACTORS NOT INVESTIGATED

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared using filtered oil from these appliances has been investigated.

RELATED PRODUCTS

Cooking-oil filters that form an integral part of another appliance are covered under:

Commercial Cooking Appliances (KNGT)

Commercial Cooking Appliances with Integral Recirculating Ventilation Systems (KNKG)

Commercial Cooking Appliances with Integral Systems for Limiting the Emission of Grease-laden Air (KNLZ)

Custom-built Food Service Equipment (KNNS)

Gas-fired Food Service Equipment (LGQX)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1889, "Commercial Filters for Cooking Oil."

Filters for Cooking Oil, Commercial (KNRF)—*Continued*

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Filter for Cooking Oil," or other appropriate product name.

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Household Cooking Appliances (KNUR)

USE AND INSTALLATION

This category covers appliances intended for household use that are designed to heat or cook food products for human consumption.

This category also covers:

Products combining features for food preparation and cooking, such as bread makers and coffee grinder/makers

Cord-connected pet food cookers and pet treat makers intended for indoor household use that are designed to heat or cook food for pet consumption

In cases where the nature or construction of equipment is such that special safety precautions beyond the requirements of ANSI/NFPA 70, "National Electrical Code," must be observed in installation or use of the appliances, the necessary special instructions are marked on the appliances themselves or are included in the installation instructions provided with the appliance.

REBUILT PRODUCTS

This category also covers household cooking appliances that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt household cooking appliances are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt household cooking appliances are subject to the same requirements as new household cooking appliances, except that a nonmetallic enclosure is required to comply with the flammability requirements for unattended portable appliances in ANSI/UL 746C, "Polymeric Materials - Use in Electrical Equipment Evaluations," and the appliances are required to be grounded.

FACTORS NOT INVESTIGATED

Neither the toxicity of coatings nor the physiological effects consuming food prepared by use of these appliances has been investigated.

RELATED PRODUCTS

Range and range components intended for separate installation in kitchen cabinets or walls, such as built-in surface unit assemblies and ovens, are covered under Ranges, Household Electric (KRMX).

Microwave ovens are covered under Microwave Cooking Appliances (KQSQ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1026, "Electric Household Cooking and Food Serving Appliances," ANSI/UL 1082, "Household Electric Coffee Makers and Brewing-Type Appliances," and UL 1083, "Household Electric Skillets and Frying-Type Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Bun Warmer," "Corn Popper," "Griddle," "Coffee Maker," "Household Cooking Appliance," "Pet Food Cooker," "Pet Treat Maker," or the name of the specific type of product as shown in the individual Listings.

For rebuilt products, the word "Rebuilt," "Refurbished" or "Remanufactured" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DE-ICING AND SNOW-MELTING EQUIPMENT (KOBQ)

USE AND INSTALLATION

This category covers fixed outdoor electric de-icing and snow-melting systems for use in accordance with Article 426 of ANSI/NFPA 70, "National Electrical Code" (NEC). The equipment is provided with means for permanent wiring connections, except that equipment rated 20 A or less and 150 V ac or less to ground may be of cord-and-plug-connected construction.

To supplement the general requirements in the NEC, the manufacturer is required to provide, with the units or mats, specific installation instructions concerning any limitations of the installation and/or use of the equipment. The instructions for mats or cable units intended for burial in concrete specifically indicate that the slab must be a double pour (poured in two parts) if that is the only acceptable means of installation. If such a limitation is not specifically mentioned, either a single or double pour may be used.

RELATED PRODUCTS

Pipe-heating cable is covered under Mobile/Manufactured Home Pipe-heating Cable (KQVU), Industrial and Commercial Pipe-heating Cable (KQXR) and Residential Pipe-heating Cable (KQY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic requirements used to investigate products in this category intended for use in residential applications are contained in UL Subject 1588, "Outline of Investigation for Roof and Gutter De-Icing Cable Units."

The basic standard used to investigate products in this category intended for use in commercial applications is IEEE 515.1 (2005), "Recommended Practice for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Commercial Applications."

The basic standard used to investigate products in this category intended for use in industrial applications is IEEE 515 (2004), "Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Industrial Applications."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "De-icing and Snow-Melting Equipment."

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DUCT HEATERS, ELECTRIC (KOHZ)

GENERAL

This category covers fixed electric duct heaters and remote control assemblies, rated 600 V or less, typically used in the air stream of a ducted system.

A duct heater is a self-contained heater (external to the air-moving unit), field installed in the air stream of a ducted system. It is designed to be installed where an adequate flow of air from a separate interlocked fan or blower system is provided. Such a heater may be located in the main supply duct of an air heating system or in one of the branch ducts. Two or more duct heaters may be installed in a group (in proximity to one another in the duct) if tests indicate acceptable results when the heaters are installed in accordance with the manufacturer's instructions.

A duct heater intended to be employed in conjunction with another source of heat is judged on the basis of its compliance with ANSI/UL 1996, "Electric Duct Heaters," and further examination and tests to determine whether or not the combination is acceptable.

Wiring Termination Provisions

For permanently connected equipment, the wiring termination provisions are based on tests and Table 310.16 of ANSI/NFPA 70, "National Electrical Code" (NEC) as follows:

1. 75°C insulated conductors at the 75°C ampacities.
2. 90°C insulated conductors at the 75°C ampacities, in which case the equipment is marked for 90°C conductors.
3. Insulation temperature rating of 75 or 90°C and wire size as marked on the unit.

Also see **INSTALLATION REQUIREMENTS** (Appliance and Utilization Equipment Terminations) under Electrical Equipment for Use in Ordinary Locations (AALZ) and **ELECTRICAL INSTALLATIONS** under Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

INSTALLATION

This equipment is intended to be installed in accordance with the NEC.

Duct Heaters, Electric (KOHZ)—Continued

The air duct system is intended to be installed in accordance with ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," and ANSI/NFPA 90B, "Installation of Warm Air Heating and Air-Conditioning Systems."

Wiring Diagrams

The proper method of electrical installation (number of branch circuits, control wiring connections, etc.) is shown on the wiring diagram and/or marking attached to the equipment.

Electric Heat Considerations

In duct heaters rated more than 48 A, the loads are subdivided so that each load does not exceed 48 A and is protected at not more than 60 A. The overcurrent protective devices are either included as an integral part of the heater or are furnished as a separate assembly. If the protective devices are furnished as a separate assembly, the heater is marked to specify that it be used with that particular separate assembly. For such separate assemblies which are specifically certified for use with electric duct heaters, see Control Panels, Remote, for Electric Duct Heaters (KMLW). Other certified separate assemblies, as referenced on the duct heater marking, may also be used.

Unless specifically indicated in the individual certifications as "Suitable for zero clearance installation," the duct heater units are intended to be installed in ducts with the clearances to combustible materials as specified in the manufacturer's installation instructions and marked on the duct heater unit itself. Care should be taken to ensure that duct heaters are positioned properly (horizontal air flow or vertical air flow) since required clearances are affected by the position of the duct work in some instances.

Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet-metal ducts attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit and ducts.

Each duct heater incorporates integral limit controls intended to protect against abnormal operating conditions that might arise from blocked inlets, blocked outlets, or fan failures. Magnetically-operated switching devices or similar components required for use with these limit controls are either included as an integral part of the heater or are furnished as a separate assembly as described above. Supplementary controls are not necessarily supplied as part of the duct heater.

A separate room thermostat must be provided to control the room air temperatures. For certifications of thermostats and similar devices, see Temperature-indicating and Regulating Equipment (XAPX). Provision for an interlock circuit, to ensure operation of the separate blower when the duct heater is energized, is included in the heater or in the separate assembly as described above.

Tests have indicated that no adverse thermal effects are obtained when duct heaters marked to indicate that they are suitable for use with heat pumps, or central cooling air conditioners or fan-coil units are installed with certain of these units [See Heating and Cooling Equipment (LZFE)], provided the duct heater is used only in horizontal or upflow systems, and the duct heater is located downstream at least 4 ft from the nearest surfaces of the heat pump, central cooling air conditioner, or fan-coil unit.

Unit Installation

Duct heaters are intended for installation in noncombustible ducts and are designed to be used individually and in groups as supplementary heat sources in air-heating systems or as primary heat sources with separate blowers where the available heat from the duct heaters is sufficient for local conditions.

Duct heaters suitable for outdoor installation are so marked. Heaters not marked as suitable for outdoor installation are for indoor use only.

The manufacturer's application and installation instructions furnished with each heater should be consulted to determine the factors applicable to the particular installation, including required distances between the heater and turns in the duct, changes in duct sizes, air filters, humidifiers, etc. Unless these instructions specify other distances for horizontal or upflow installations, (1) turns in the duct on the inlet side of the heater should be located at least 4 ft from the heater, (2) turns in the duct on the outlet side of the heater should be located at least 2 ft from the heater, and (3) changes in duct sizes, air filters, humidifiers, etc., should be located at least 4 ft from either side of the heater. Duct heaters having instructions describing particular design characteristics and/or installations are investigated for those specific characteristics and/or installations.

The proper installation of these heaters requires careful consideration of the individual manufacturer's design characteristics, taking into consideration the number of heaters employed, the volume of air passing through the heaters, and the ambient temperatures and source of the air on the input side of the heater installation.

Motor Group Installation

In permanently connected units employing two or more motors or a motor(s) and other loads operating from a single supply circuit, the motor overload protective devices (including thermal protection for motors) and

Duct Heaters, Electric (KOHZ)—Continued

other factory-installed motor components and wiring are investigated on the basis of compliance with the motor branch-circuit short-circuit and ground-fault protection requirements of Section 430.53(C) as referenced in Section 440.22 of the NEC. Such multimotor and combination load equipment is intended to be connected only to a circuit protected by fuses or a circuit breaker with a rating that does not exceed the value marked in the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses or "HACR Type" circuit breakers, the circuit is intended to be protected only by the type of protective devices specified.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1996, "Electric Duct Heaters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Duct Heater."

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HEATERS, SAUNA AND STEAM BATH (KPJV)

Sauna Heating Equipment (KPSX)

USE AND INSTALLATION

This category covers heating equipment intended for concentrated heating at elevated temperatures in relatively confined areas with or without the addition of moisture.

Particular attention should be paid to the heater installation restrictions, such as warning markings, remote thermostats and control installations, guards, minimum size of room, and distance from adjacent surfaces that are marked on the heater.

This equipment is intended for permanent connection to the supply source, except for some sauna heater-room combination units that may be cord connected as specifically indicated.

FACTORS NOT INVESTIGATED

The physiological effects of heat, reduced ventilation, and other conditions that may be found within the room where the heater is installed have not been investigated.

RELATED PRODUCTS

Steam bath equipment is covered under Steam Bath Equipment (KQBZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 875, "Electric Dry-Bath Heaters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Sauna Heater" or "Sauna," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Steam Bath Equipment (KQBZ)

USE AND INSTALLATION

This category covers steam bath generators, combination room and steam generator systems, and steam bath cabinets intended for high-humidity concentrated heating at elevated temperatures for personal bathing.

PRODUCT CATEGORIES BY CATEGORY CODE

Steam Bath Equipment (KQBZ)—Continued

Steam bath equipment accessories, such as gangable steam units, timer options, and drain options, are also covered under this category. These accessories are intended for installation only on certified equipment as designated in the individual certifications. The accessories are intended primarily for field installation, but may be factory installed.

Information concerning field-wiring connections, mounting location, installation clearances, end-use equipment catalog numbers, etc., are marked on the accessory, and/or in detailed installation instructions accompanying each accessory.

Particular attention should be paid to installation instructions of the steam generator and markings on the product for restrictions, such as minimum distances to adjacent surfaces, valving of the steam outlet, etc.

Steam generators covered under this category have not been investigated for their suitability as a source of steam for space-heating purposes or for industrial or commercial use.

FACTORS NOT INVESTIGATED

The physiological effects of heat, reduced ventilation, and other conditions that may be found within the room where the steam is discharged or where the steam bath is installed have not been investigated.

RELATED PRODUCTS

Sauna heating equipment is covered under Sauna Heating Equipment (KPSX).

Steam generators for industrial or commercial use are covered under Heaters, Industrial and Laboratory (KQLR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 499, "Electric Heating Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Steam Bath Heater," "Steam Bath Equipment," "Steam Bath Cabinet," "Shower/Steamer Unit," or other appropriate product name as shown in the individual Listings.

The Listing Mark for accessories may appear on the smallest unit container in which the product is packaged.

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HOSPITALITY-USE APPLIANCES (KQDA)**Hospitality-use Drip-type Coffee Makers (KQDJ)****USE AND INSTALLATION**

This category covers hospitality-use drip-type coffee makers and other similar drip-type brewing appliances intended for use by the general public in hotel sleeping areas and office environments.

Hospitality-use drip-type coffee makers are subject to the same requirements as household drip-type coffee makers, except that the appliances are: grounded, provided with an automatic shutoff manual reset operating control or an electronic on/off push-button switch with a maximum one-hour auto shutoff and "lock out" feature, provided with a cord tag containing Important Safeguards information, and provided with user maintenance instructions for office building or hotel maintenance and management staff.

In cases where the nature or construction of component equipment is such that special precautions beyond the requirements of ANSI/NFPA 70, "National Electrical Code," must be observed in installation or use of the appliances, the necessary special instructions are marked on the appliances themselves or are included in the installation instructions provided with the appliance.

FACTORS NOT INVESTIGATED

Neither the toxicity of coatings nor the physiological effects of consuming food prepared by use of these appliances has been investigated.

RELATED PRODUCTS

Drip-type coffee makers intended for commercial use that are found in commercial kitchens, restaurants, or other business establishments where food is dispensed are covered under Commercial Cooking Appliances (KNGT).

Hospitality-use Drip-type Coffee Makers (KQDJ)—Continued

Drip-type coffee makers intended for household residential use are covered under Household Cooking Appliances (KNUR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1082, "Household Electric Coffee Makers and Brewing-Type Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Hospitality-use Drip-type Coffee Maker" or "Hospitality-use Coffee Maker."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

IMMERSION-TYPE LIQUID HEATERS, INDUSTRIAL (KQGV)**USE AND INSTALLATION**

This category covers immersion-type liquid heaters intended for heating water-based liquids. The corrosion resistance of the immersed parts has been investigated on the basis of water. The degree of corrosion resistance to acidic, alkaline, etc., water-based liquids may vary depending on the material and/or coating on the immersed parts and the type and strength of the solution. The heater manufacturer's information should be consulted in selecting a heater for an application.

Through-the-wall heaters should be operated only while the heating element is completely immersed in a water-based liquid. Other immersion-type liquid heaters should be immersed to a depth as marked on the product or as indicated in the installation and use instructions.

The heaters incorporate a temperature-limiting device that responds to the temperatures created by the heater; or the heater is marked to specify that a low-liquid-level cutoff control should be installed and connected to de-energize the heater upon a low-liquid-level condition.

Heaters intended to be installed through the wall of a vessel have means for permanent wiring connections to the electrical supply. Other immersion-type liquid heaters may have either a power-supply cord for cord-and-plug connection or provision for permanent wiring connections to the electrical supply.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 499, "Electric Heating Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Immersion Type Liquid Heater."

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HEATERS, INDUSTRIAL AND LABORATORY (KQLR)**GENERAL**

This category covers heating appliances rated 600 V or less and intended for use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), for industrial and laboratory applications.

Heating appliances covered under this category include branding irons, brazers, dental laboratory heaters, electric kilns, etchers, glue pots, heat guns, heating cable, hot plates, incubators of the air flow and water types,

Heaters, Industrial and Laboratory (KQLR)—Continued

laboratory furnaces and dryers, mobile drying ovens, soldering guns and irons, soldering stations and tools, vacuum ovens and water baths.

Portable electric heating devices of the soldering-iron-type present certain inherent hazards. The temperatures necessary for their normal use are high enough to cause fire if they are left in contact with combustible materials.

Infrared heating equipment has not been investigated for use in hazardous (classified) locations as defined in the NEC.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, suitable warnings and necessary special instructions are marked on the equipment.

Industrial and laboratory hot plates, ovens and other similar products have not been investigated for explosion and fire hazards involved in the heating of chemicals.

Vapor degreasers are intended for use only with the specific cleaning fluids. Adequate ventilation is required for this equipment and the manufacturer's installation and operation instructions should be followed. The physiological effects of the cleaning fluids intended for use with the degreasing equipment have not been investigated.

Steam generators and boilers are required to be provided with tanks built in conformance with the ASME Boiler Construction Code, and suitable pressure relief mechanisms. Water temperatures are not limited to a maximum of 90°C.

An explosion hazard may exist in steam generators because of the accumulation of oxygen and hydrogen in an unvented system operated under standby conditions for long periods of time, or to which condensate is returned. Suitable venting devices should be installed and such systems should be purged frequently.

Steam generators and boilers have not been investigated for their suitability as a source of hot water or steam for space-heating purposes.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 499, "Electric Heating Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Laboratory Hot Plate," "Soldering Iron," "Laboratory Incubator," "Water Bath," "Branding Iron," or the name of the specific type of product as shown in the individual Listings.

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MICROWAVE COOKING APPLIANCES (KQSQ)**GENERAL**

This category covers cooking equipment incorporating one or more microwave generators operating in the normal ISM bands of 915 + or - 25 and 2450 + or - 50 MHz. This equipment includes portable and stationary microwave cooking appliances employing resistive-type heating elements for baking, broiling, browning, convection cooking, or similar operations.

This category also covers combination microwave oven vent-hood fans, and kits for converting counter-top units to built-in, under-cabinet, wall-mounted or similar installations.

The appliances are intended for household or commercial use in ordinary locations in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). In cases where the nature or construction of the equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, the necessary special instructions are marked on the appliances themselves or are included in the installation instructions provided with the appliance.

All microwave cooking appliances, cord-connected and permanently connected, have provision for being properly grounded.

Products specifically designed for field installation in or on a microwave cooking appliance or to adapt a microwave cooking appliance from one type of installation to another are indicated in the individual certifications and are marked to identify the microwave cooking appliance(s) with which they have been investigated.

Microwave Cooking Appliances (KQSQ)—Continued

Counter-top and under-cabinet mounted units have been investigated individually in two-sided right-angle alcoves. Products that have been investigated and found suitable for some other type of usage, such as built-in installation, side-by-side mounting, stacking or field installation over electric or gas ranges are identified for such usage by installation instructions, product markings, or both.

Units suitable for installation above a range or counter-mounted cooking unit are identified for such installation and the minimum acceptable vertical clearance between the microwave cooking appliance and the range or counter mounted cooking unit is specified in instructions, product markings, or both.

These microwave cooking appliances are provided with a marking indicating whether they are intended for household use, commercial use, or both.

These microwave cooking appliances have been investigated to demonstrate that the microwave radiation emission is within the limitations prescribed by the U.S. Department of Health and Human Services, Food and Drug Administration, Center for Devices and Radiological Health.

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared by use of these appliances have been investigated.

Microwave ovens suitable for use in a marine environment are covered under Cooking Appliances, Electrical, Marine (EJOY).

REBUILT PRODUCTS

This category also covers microwave cooking appliances which are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt microwave cooking appliances are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Rebuilt microwave cooking appliances are subject to the same requirements as new microwave cooking appliances.

RELATED PRODUCTS

Household electric ranges and built-in ovens incorporating a microwave cooking feature are covered under Ranges, Household Electric (KRMX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 923, "Microwave Ovens."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Microwave Oven," "Microwave Food Warmer," "Microwave Cooking Appliance," "Microwave/Oven Vent Hood Fan," or other appropriate product name as shown in the individual Listings.

For rebuilt products, the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

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PIPE-HEATING CABLE (KQUF)**GENERAL**

This category covers electric heating cable designed to be secured to pipes to reduce the likelihood of freezing or to facilitate flow of viscous liquids. Some units incorporate a thermostat that automatically turns on the heating cable when the temperature drops below a predetermined value.

Pipe-heating cable is intended to be installed in accordance with the manufacturer's installation instructions.

Information is provided, either as marking on the cable or in the installation instructions, as to the intended application of the heating cable. The certifications appear separately under the following subcategories: Mobile/Manufactured Home Pipe-heating Cable (KQVU), Industrial and Commercial Pipe-heating Cable (KQXR) and Residential Pipe-heating Cable (KQYI).

The ability of heating cable to maintain temperatures of liquids in pipes depends upon ambient temperature conditions and has not been investigated.

RELATED PRODUCTS

For de-icing and snow melting equipment, see De-icing and Snow Melting Equipment (KOBQ).

Pipe-heating Cable (KQUF)—Continued

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Mobile/manufactured Home Pipe-heating Cable (KQVU)**USE AND INSTALLATION**

This category covers electric heating cable intended to reduce the likelihood of water freezing in exposed pipes of mobile/manufactured homes. The cable is provided with an attachment plug and intended to be connected to a receptacle outlet on the underside of the mobile/manufactured home.

Equipment is intended to be installed in accordance with the requirements of Articles 427 and 550 of ANSI/NFPA 70, "National Electrical Code."

Pipe-heating cable is intended to be installed in accordance with the manufacturer's installation instructions.

Unless specifically indicated otherwise by marking on the heating cable or in the installation instructions, this heating cable is intended for use only on metallic pipes.

RELATED PRODUCTS

Heating cable for use with fire-suppression sprinkler or standpipe systems is covered under Heating-cable Systems for Use on Fire-protection-system Piping (VGNJ).

Heating cable for use as fixed outdoor electric de-icing and snow-melting systems is covered under De-icing and Snow-melting Equipment (KOBQ).

Heating cable for use to reduce the likelihood of water freezing in residential pipes is covered under Residential Pipe-heating Cable (KQYI).

ADDITIONAL INFORMATION

For additional information, see Pipe-heating Cable (KQUF), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1462, "Outline of Investigation for Mobile Home Pipe Heating Cable."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Mobile Home Pipe Heating Cable" or "Mobile/Manufactured Home Pipe Heating Cable."

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Industrial and Commercial Pipe-heating Cable (KQXR)**USE AND INSTALLATION**

This category covers electric heating cable intended to be installed on or in pipes in accordance with Article 427 of ANSI/NFPA 70, "National Electrical Code."

The heating cable is intended to be connected to the supply system by permanent wiring methods or by flexible supply cord with an attachment plug where permitted.

Unless specifically indicated otherwise by marking on the heating cable or in the installation instructions, the heating cable is intended for use only on metallic pipes.

RELATED PRODUCTS

Heating cable for use with fire-suppression-sprinkler or standpipe systems is covered under Heating-cable Systems for Use on Fire-protection-system Piping (VGNJ).

ADDITIONAL INFORMATION

For additional information, see Pipe-heating Cable (KQUF), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 515, "Electrical Resistance Heat Tracing for Commercial and Industrial Applications."

Industrial and Commercial Pipe-heating Cable (KQXR)—Continued

Pipe-heating cable intended for use in industrial applications is additionally investigated to the performance requirements of IEEE 515 (2004), "Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Industrial Applications."

Pipe-heating cable intended for use in commercial applications is additionally investigated to the performance requirements of ANSI/IEEE 515.1 (2005), "Recommended Practice for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Commercial Applications."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Pipe Heating Cable."

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Residential Pipe-heating Cable (KQYI)**USE**

This category covers electric heating cable intended to reduce the likelihood of water freezing in residential pipes. The cable is provided with a flexible cord and attachment plug and is intended specifically for residential pipe-heating uses, such as sprinkler systems and in crawl spaces, basements, well houses, and the like.

This cable is intended for use in accessible locations only.

This cable is suitable for use on metal and rigid plastic water-filled pipes.

ADDITIONAL INFORMATION

For additional information, see Pipe-heating Cable (KQUF), Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2049, "Outline of Investigation for Residential Pipe Heating Cable."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Residential Pipe Heating Cable."

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RADIANT HEATING EQUIPMENT (KQYZ)**USE AND INSTALLATION**

This category covers electric heating cable, cable on a carrier, and flexible and rigid electric heating panels and heating panel sets intended to be installed as fixed equipment for radiant space heating and/or floor warming in accordance with Article 424, Sections V and IX of ANSI/NFPA 70, "National Electrical Code" (NEC). These products form an integral part of the building construction after on-site assembly, installation and connection.

The manufacturer is required to provide with the units specific installation instructions concerning any limitations of the installation and/or use of the equipment. These supplement the installation requirements for electric space-heating systems in the NEC. Failure to comply with all installation instructions may result in a risk of fire or electric shock.

The instructions for heating devices intended for burial in concrete specifically indicate that the slab must be a double pour (poured in two parts) if that is the only acceptable means of installation. If such a limitation is not specifically mentioned, either a single or double pour may be used. Cable units are provided with a tag attached to the nonheating leads which supplement the installation instructions.

Heating products include instructions concerning the intended method of connection to building power, and if additional protection (e.g., conduit) of nonheating leads is anticipated during installation.

Connectors to be assembled to wire or panel busbars in the field using a special tool are intended to be assembled using the tool specified by the manufacturer.

Radiant Heating Equipment (KQYZ)—Continued

Stapling guns, if used in the installation of heating cable devices require specially designed heads to prevent damage to the conductor insulation. Only those guns recommended by the cable unit manufacturer should be used for this purpose.

PRODUCT MARKINGS

Radiant heating panels and heating panel sets are marked "Radiant Ceiling Heating Panel," "Radiant Floor Heating Panel," "Radiant Heating Panel" or "Radiant Concrete Heating Panel," or equivalent, as appropriate. Heating devices intended for concrete installation are further marked "Concrete Installation Only."

The Certification Mark (as noted under UL MARK below) is provided on the product by the manufacturer, or is included with the above marking and shipped with the product, for attachment to the nonheating leads 3 in. (75 mm) from the source of supply during installation.

The Certification Mark will not appear on other field-applied labels provided with the radiant heating equipment, such as labels for the panel, heating controls, or any other device.

RELATED PRODUCTS

Fixed electric heating equipment for pipelines and vessels is covered under Mobile/Manufactured Home Pipe Heating Cable (KQVU) and Pipe Heating Cable (KQUF).

Fixed outdoor electric de-icing and snow-melting equipment is covered under De-icing and Snow-melting Equipment (KOBQ).

Heating panels intended to be installed in a dropped or suspended ceiling or heating equipment with glowing wire heating elements is covered under Air Heaters, Room, Fixed and Location Dedicated (KKWS).

ADDITIONAL INFORMATION

For additional information, see Heaters and Heating Equipment (KKBV), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate radiant heating panels and heating panel sets in this category is UL 1693, "Electric Radiant Heating Panels and Heating Panel Sets."

The basic standard used to investigate electric space-heating cable in this category is UL 1673, "Electric Space Heating Cables."

The basic requirements used to investigate electric heating products for installation under floor coverings in this category are contained in UL 1683, "Outline of Investigation for Electric Heating Products for Installation Under Floor Coverings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Radiant Heating Cable," "Radiant Heating Panel Unit" or "Radiant Heating Embedded Unit," or other appropriate product name as shown in the individual Listings, preceded by the words "Radiant Heating."

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RANGES, HOUSEHOLD ELECTRIC (KRMX)

GENERAL

This category covers household-type, all-electric cooking equipment (consisting of oven and surface units), combination electric and solid-fuel cooking equipment (consisting of electric ovens and surface units, together with a solid-fuel combustion section), wall-mounted and counter-mounted cooking equipment.

Cooking equipment is investigated and tested to determine that it can be properly installed in accordance with the installation instructions provided by the manufacturer. Some of the more common arrangements are described below.

Microwave cooking appliances and hood fans with or without a shelf or compartment to accommodate a microwave oven that have been investigated and found suitable for installation above a counter-level range or a counter-mounted cooking unit are identified for such installation. The minimum acceptable vertical clearance between the counter-level range or counter-mounted cooking unit and this appliance is specified in the appliance installation instructions, product markings, or both. See Microwave Cooking Appliances (KQSQ) and Electric Fans (GPVV).

All-electric Arrangements

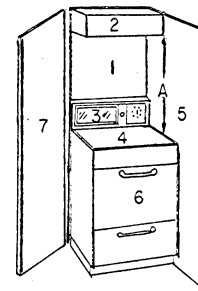
Counter-level Ranges — (See Fig. 1)

The range, with or without a warming tray located on the top of the back guard, may be installed close against vertical walls at the back and at

Ranges, Household Electric (KRMX)—Continued

both sides, and a top cabinet may be installed not less than "A" inches above the top of the cooking platform. See Dimension "A" in Fig. 1.

Fig. 1



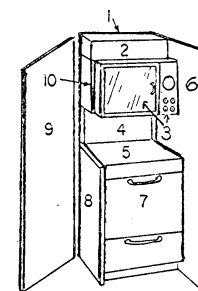
- 1. Building back wall
- 2. Top building cabinet
- 3. Oven and top control panel
- 4. Cooking surface
- 5. Building side wall
- 6. Oven
- 7. Building side wall

A = 30 in. minimum clearance between the top of the cooking platform and the bottom of an unprotected wood or metal cabinet; or A = 24 in. (not applicable when an electrically heated warming tray is provided on the back guard) when the bottom of the wood or metal cabinet is protected by not less than 1/4 in. flame-retardant millboard covered with not less than No. 28 MSG sheet steel, 0.015 in. stainless steel, 0.024 in. aluminum or 0.020 in. copper.

Eye-level Ranges — (See Fig. 2)

The range (with either one or two ovens) may be installed close against a vertical wall at the back, and a top cabinet may be installed above the upper oven. If the range does not have a top control panel (this design not shown in illustration) an upper-end cabinet of the same depth as the cabinet above the oven and a base cabinet both 6 in. minimum width should be installed at the end of the range opposite the hinged end of the door. If a top control panel is provided at that end, the upper-end cabinet and base cabinet may be omitted and the range may be installed close against a vertical wall at that end. The end of the range on which the hinges are located may be installed close against a vertical wall, except that when the wall prevents opening of the door to a position which will permit the removal of an oven rack, an upper-end cabinet of the depth mentioned above and a base cabinet (both of sufficient width) may be installed such that the required opening of the door is achieved. If a lower oven or storage area is not provided to permit floor mounting, the range may be installed on a bottom cabinet or over any specific appliance with which the range is intended to be used.

Fig. 2



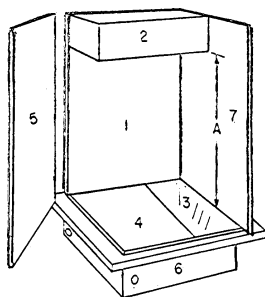
- 1. Building back wall
- 2. Top building cabinet
- 3. Oven and top control panel
- 4. Range back guard
- 5. Cooking surface
- 6. Building side wall
- 7. Oven and bottom building cabinet
- 8. Base building cabinet
- 9. Building side wall
- 10. Upper-end building cabinet

All-electric Wall-mounted Ovens and Counter-mounted Cooking Units

These include wall-mounted and counter-mounted cooking equipment or combinations thereof intended to be permanently installed on or in the building structure. Spacings to combustible materials are the minimum allowed by the construction of the device. Unless specifically indicated by marking on the appliances, the individual oven units or counter-mounted cooking units are intended for single-unit installation only and are not intended for stacking or placing in pairs side by side or back to back. When double-unit installation is intended, the installation instructions give the minimum centerline spacings unless the units are suitable for the smallest clearance between units permitted by the construction. For cooking units, a top cabinet may be installed "A" inches above the top of the cooking platform. See Dimension "A" in Fig. 3, and note following Fig. 1.

Ranges, Household Electric (KRMX)—Continued

Fig. 3



- 1. Building back wall
- 2. Top building cabinet
- 3. Control panel
- 4. Cooking surface
- 5. Building side wall

- 6. Bottom building cabinet
- 7. Building side wall

Combination Ranges

As permitted by the installation marking, the range may be installed close against a vertical wall or with no more than a 6 in. air space to a vertical wall at the end where electrical units are located. See the table below for the spacings at the flue or vent and at the end of the range where solid fuel is burned.

Type or Fuel & Range Construction	Spacing to Wall From Nonelectrical End of Range in In.	Spacing From Flue or Vent in In.
Solid-fuel fire pot without fire-clay lining	36	18
Solid-fuel fire pot with fire-clay lining	24	18

All-electric ranges, wall-mounted and counter-mounted cooking equipment and combination ranges, intended for nominal 125/250 V or less (including those rated 120/208), three-wire, operation are provided with a bonding connection between the frame of the appliance and the neutral to provide grounding in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). Unless the appliance is marked "Warning: Frame Grounded To Neutral Of Appliance Through A Link. This Range Not For Use In Mobile Homes Or In Areas Where Local Codes Do Not Permit Grounding Through Neutral," instructions are provided for disconnecting the bond and making a direct connection of the metallic parts or the unit to ground.

The flexible metallic conduit and high-temperature insulated leads provided with some ranges are tested and recognized as a component part of the equipment. Unless a conduit fitting or outlet box is installed at the factory, tape or other means is provided at the end of the conduit to protect the conductors during shipment. This protection is not intended to take the place of a conduit bushing or fitting which is required by the NEC.

FACTORS NOT INVESTIGATED

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared by use of these appliances has been investigated.

RELATED PRODUCTS

Cooking equipment/refrigerator combinations are covered under Kitchen Units, Refrigerated (SJPT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 858, "Household Electric Ranges," and ANSI/UL 923, "Microwave Cooking Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Range" or "Electric Range," or other appropriate product name.

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WATER HEATERS (KSAV)

Commercial Storage Tank and Booster Water Heaters (KSBZ)

USE AND INSTALLATION

This category covers water heaters intended to supply hot water for commercial or industrial use, and to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

These water heaters are equipped with a temperature-regulating control that limits the water temperature to a maximum of 90°C (194°F). This control has been preset at the factory to a maximum setting of 60°C (140°F). These heaters are also equipped with a manually reset temperature-limit control that restricts the water temperature to a maximum of 99°C (210°F) should a regulating control fail.

A combination temperature-pressure relief valve is supplied or factory installed on these heaters. When supplied separately, instructions for mounting the valve are provided with the heater.

RELATED PRODUCTS

Water heaters intended for use in marine environments are covered under Water Heaters, Marine (LXWV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1453, "Electric Booster and Commercial Storage Tank Water Heaters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Storage Tank Water Heater" or "Booster Water Heater," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Water Heaters, Space Heating (KSDR)

USE AND INSTALLATION

This category covers water heaters intended for the heating of water and storage of hot water for space-heating purposes, to be installed in accordance with ANSI/NFPA 70, "National Electrical Code." These heaters are intended for use in jurisdictions that permit the use of hot water space-heating systems that do not employ tanks constructed and marked in accordance with the "ASME Boiler and Pressure Vessel Code." Authorities Having Jurisdiction should be consulted before installation.

These heaters are equipped with temperature-regulating devices that allow a water temperature not higher than 90°C (194°F) and also with temperature-limiting devices that limit the water temperature to a maximum of 99°C (210°F).

RELATED PRODUCTS

Pressurized electric water heaters intended for space-heating applications that are constructed and marked in accordance with the appropriate "ASME Boiler and Pressure Vessel Code" are covered under Boilers, Electric (BDJS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 834, "Heating, Water Supply, and Power Boilers - Electric."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Space-heating Water Heater," or other appropriate product name as shown in the individual Listings.

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Household Water Heaters, Storage Tank (KSDT)

USE AND INSTALLATION

This category covers storage tank water heaters rated 600 V or less and 12 kW or less and having a tank capacity of more than one gal and not more than 120 gals.

This category does not cover immersed electrode, side arm, booster, instantaneous or immersion-type water heaters or water-heating portions of water-dispensing appliances.

These water heaters are intended for household use and permanent connection to the supply source in accordance with ANSI/NFPA 70, "National Electrical Code."

Household storage tank water heaters are equipped with a temperature-regulating device intended to restrict the water temperature to a maximum of 85°C (185°F). This device has been preset at the factory to a maximum setting of 51.7°C (125°F). These heaters are also equipped with a manually reset temperature-limit control that restricts the water temperature to a maximum of 99°C (210°F) should a regulating control fail.

Safety devices, such as temperature-pressure-relief mechanisms, are not required to be furnished as part of the certified water heater, but markings and instructions accompany each water heater indicating that a suitable safety device which complies with the local plumbing codes shall be connected to the heater at the time it is installed.

PRODUCT MARKINGS

Water heaters in accordance with Part 3280.707(d) (1) of HUD Mobile Home Construction and Safety Standards for Energy Efficiency are marked "Design evaluated by UL in accordance with Part 3280.707(d) (1) of HUD Mobile Home Construction and Safety Standards for Energy Efficiency."

RELATED PRODUCTS

Water heaters intended for use in marine environments are covered under Water Heaters, Marine (LXWV).

Solar-electric water heaters are covered under Water Heaters, Solar (UZWZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 174, "Household Electric Storage Tank Water Heaters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Household Storage Tank Water Heater," or other appropriate product name as shown in the individual Listings.

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Immersion Water Heaters (KSFJ)

GENERAL

This category covers immersion water heaters, both cord-connected and for permanent connection.

Some immersion water heaters intended for permanent connection incorporate thermostats and auxiliary switches which respond to the temperatures created by the immersion water heaters. The acceptability of thermostats or auxiliary switch construction; as temperature regulating and/or safety controls when incorporated in the ultimate equipment assembly for which they are intended, must be determined in accordance with the requirements applicable to that equipment.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 499, "Electric Heating Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Immersion Heater," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufac-

Immersion Water Heaters (KSFJ)—Continued

turer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Miscellaneous Water Heaters (KSGR)

GENERAL

This category covers instantaneous heaters, strap-on-type heaters, heaters for sink or water-cooler mounting, and other water heaters not covered under Household Water Heaters, Storage Tank (KSDT), Commercial Storage Tank and Booster Water Heaters (KSBZ) or Immersion Water Heaters (KSFJ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 499, "Electric Heating Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Instantaneous Water Heater" or "Water Heater," or other appropriate product name as shown in the individual Listings.

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HEATERS, WATERBED (KSHU)

USE

This category covers cord-connected electric heaters, usually in the form of mats, intended for use under the mattresses of waterbeds. Heaters employing external, user-adjustable temperature control units are covered as a unit, for installation in accordance with the manufacturer's instructions.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1445, "Electric Water Bed Heaters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Waterbed Heater."

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HEATERS, SPECIALTY (KSOT)

USE AND INSTALLATION

This category covers heating appliances rated 600 V or less for use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). This includes heating appliances intended for household and industrial applications, as well as products that generate steam for other than space-heating purposes, and have an electrical power rating of 15 kW or less per steam-generating vessel. A heating appliance is defined as an electrically energized product that directly or indirectly generates heat to perform its intended function.

Heating devices may present certain inherent hazards. The temperatures necessary for their normal use can be high enough to cause fire if they are left in contact with combustible materials.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, necessary special instructions are marked on the equipment.

Heaters, Specialty (KSOT)—Continued

REBUILT PRODUCTS

This category also covers steam-cleaning machines, steam-cleaning machines with sweeper features and steam-cleaning machines with vacuum features that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt steam-cleaning machines, steam-cleaning machines with sweeper features and steam-cleaning machines with vacuum features are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt steam-cleaning machines, steam-cleaning machines with sweeper features and steam-cleaning machines with vacuum features are subject to the same requirements as new steam-cleaning machines, steam-cleaning machines with sweeper features and steam-cleaning machines with vacuum features.

Rebuilt products are required to be provided with a date code indicating the date of rebuilding.

RELATED PRODUCTS

Hand dryers incorporating fans without heaters are covered under Fans, Electric (GPVV).

Industrial and laboratory heaters, including mobile drying ovens, soldering stations and tools, laboratory furnaces, incubators, hot plates, electric kilns, dental laboratory heaters, and the like are covered under Heaters, Industrial and Laboratory (KQLR).

Devices intended for vaporization of water, certain medicaments in water solution and glycol are covered under Vaporizers (YEIV).

Incubators and brooders intended for use on farms and commercial hatcheries are covered under Incubators and Brooders (NHYZ).

Heated air deodorizers and air fresheners are covered under Deodorizers and Air Fresheners (EOGX).

Instantaneous water heaters, strap-on heaters, heaters for sink or water-cooler mounting are covered under Miscellaneous Water Heaters (KSGR).

Heaters intended for installation in or adjacent to swimming pools or spas are covered under Heaters (WBRR).

Household vacuum cleaners provided with a steam-cleaning feature, where the vacuum cleaner is the appliance's primary function, are covered under Vacuum Cleaning Machines and Blower Cleaners (DMLW).

Steam-cleaning machines with sweeper features, where the sweeper function is the appliance's primary function, are covered under Cleaning Machines, Motor Operated (DMGK).

High-pressure cleaning machines provided with steam-cleaning features, where the high-pressure-cleaning function is the appliance's primary function, are covered under High-pressure Cleaning Machines, Electrically Operated (DMKK).

ADDITIONAL INFORMATION

For additional information, see Heaters and Heating Equipment (KKBV), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 499, "Electric Heating Appliances."

Steam-cleaning machines with vacuum-cleaning features, where the steam cleaner is the appliance's primary function, are additionally investigated to ANSI/UL 1017, "Vacuum Cleaners, Blower Cleaners and Household Floor Finishing Machines."

Steam-cleaning machines with sweeper features, where the steam cleaner is the appliance's primary function, are additionally investigated to ANSI/UL 73, "Motor-Operated Appliances."

Steam-cleaning machines with high-pressure-cleaning features, where the steam cleaner is the appliance's primary function, are additionally investigated to ANSI/UL 1776, "High-Pressure Cleaning Machines."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Hand Dryer," "Pet Dryer," "Embosser," "Stock Tank Heater," "Charcoal Igniter," or the name of the specific type of product as shown in the individual Listings.

For rebuilt products, the word "Rebuilt," "Refurbished" or "Remanufactured" precedes the product name.

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HEATERS, EMITTER TYPE, CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (KSSG)

USE AND INSTALLATION

Heaters, Emitter Type, Classified for Use in Specified Equipment (KSSG)—Continued

This category covers heaters intended for installation on specific models of UL-certified heating equipment that are shipped from the factory without heaters installed. These heaters have been investigated by UL in specific models identified in markings or instructions to determine that, when used in accordance with the manufacturer's instructions, the complete product complies with applicable requirements.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 499, "Electric Heating Appliances."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY]

FOR USE WITH [identification of specified UL Listed product] Control No.

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HEATING APPLIANCES (KTCR)

GENERAL

This category covers heating appliances intended for installation and use in accordance with the following standards as appropriate:

- ANSI/NFPA 31, "Installation of Oil-Burning Equipment"
- ANSI/NFPA 54, "National Fuel Gas Code"
- ANSI/NFPA 58, "Liquefied Petroleum Gas Code"
- ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems"
- ANSI/NFPA 90B, "Installation of Warm Air Heating and Air-Conditioning Systems"

When installing manufactured home and recreational vehicle appliances, see also the Department of Housing and Urban Development's Manufactured Home Construction and Safety Standards or ANSI/NFPA 1192, "Recreational Vehicles."

Heating appliances are investigated to determine the suitability of the construction and performance of the appliances as an assembly and of the fuel-burning apparatus, controls, electrical features and other parts furnished by the manufacturer as part of the Listed assembly. It is also determined that combustible walls and surfaces adjacent to or in contact with the appliance will not attain unsafe temperatures when the appliance is installed and used as directed.

Heating appliances are marked to indicate minimum clearances in inches, type of flooring, when they may be installed in an alcove or closet, and the total free area of the required air openings into a closet. Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet-metal ducts and plenum attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, ducts and plenum.

When the Listing Mark on an appliance designates the primary safety control to be used, such appliances are suitable for operation when a competent attendant may not be present provided the appliance is so equipped. The primary safety control is designated by the control group number in accordance with the plan and classification under Controls, Primary Safety (MCCZ).

The safety control to be used with the appliance will be indicated by either stating the manufacturer's name and marking of the particular control or controls to be used, or by stating the group number of the control to be used. When the group number is specified, the burner shall be provided with one of the controls classified as "Interchangeable." When a control manufacturer's name is specified with the group number, only the controls of that manufacturer classified in that group should be used.

Some burners are provided with integral primary safety controls or integral antiflooding devices and, when such controls are provided, the Listing

Mark will specify "Integral" with or without the group designation, in which case only the control included as part of the appliance by the manufacturer shall be used.

For convenience, the primary safety control manufacturers' names will be abbreviated by using the first letter of each word in their corporate name when necessary to refer to them in the individual Listings.

When the Listing Mark on an appliance includes the statement "For Operation Only in Presence of Competent Attendant," such appliances are not furnished with primary safety controls and are intended for operation only in the presence of a competent attendant.

The Listing Mark applied to an oil-burning appliance designates the ANSI/ASTM D396 grade number of the fuel oil, or other fuel, for which the appliance is Listed.

If the appliance is also investigated in accordance with a standard other than a UL Standard, the marking on the appliance includes the designation of that standard.

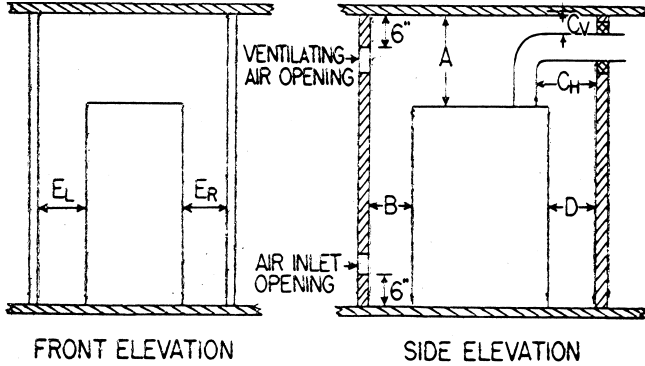
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BOILER ASSEMBLIES (KVFT)

USE AND INSTALLATION

This category covers gas-, gas-oil-, and oil-fired boiler assemblies intended for installation on the type of floors and with clearances to combustible construction not less than indicated on the boiler assembly. They are provided with primary safety controls as indicated in the boiler assembly Listing Mark or in the burner Listing Mark and with limit controls.

The sketches, dimension symbols and abbreviations as illustrated below are referenced in the individual Listings to indicate minimum clearances in inches, type of flooring, when an appliance may be installed in an alcove or closet, and the total free area of the required air openings into a closet. This information is also marked on the appliance. The clearances so designated are the minimums required to avoid overheating; additional clearances may be needed for accessibility.



Installation Symbols and Abbreviations

Descriptions of symbols and abbreviations applicable to the installation of boiler assemblies are as follows:

- A - Clearance above top of boiler
- B - From front of boiler. Prefix "C" to numeral indicates suitability for closet or alcove installation; prefix "A" indicates suitability for alcove installation only
- C_H - From chimney or vent connector measured horizontally or below pipe
- C_V - From chimney or vent connector measured vertically above pipe
- D - From back of boiler
- E_L - From left side of boiler
- E_R - From right side of boiler
- F - Indicates type of flooring: NC = Noncombustible, C = Combustible
- G - Total minimum free area, in square inches, of air openings into a closet

Typical Installation Clearances for Gas-, Gas-Oil-, and Oil-fired Boiler Assemblies

When a gas-, gas-oil-, or oil-fired boiler assembly is Listed for typical installation clearances, the individual Listings refer to the Form designation; when the clearances are not typical, each clearance is indicated by the appropriate symbols in the individual Listings. If a boiler assembly Listed for alcove or closet installation is installed in a room which is large in relation to the size of the boiler assembly, it may be installed at the minimum clearances specified for closet and alcoves or as indicated by the designated optional Form.

Boiler Assemblies (KVFT)—Continued

Form designations for typical installation clearances for gas-, gas-oil-, and oil-fired boiler assemblies installed in rooms are as follows:

Form	Standard Minimum Clearances (in.)						F
	A	B	C_H	C_V	D	E_L	
II	6	24	18	18	6	6	NC
IIa	6	24	18	18	6	6	C
III	18	48	18	18	18	18	NC
IIIa	18	48	18	18	18	18	C
IV	48	96	36	36	36	36	NC
IVa	48	96	36	36	36	36	C
XII	6	18	6	6	6	6	NC
XIIa	6	18	6	6	6	6	C

Gas-, gas-oil-, and oil-fired boiler assemblies Listed for Forms II, IIa, III, and IIIa are low-heat appliances; those Listed for Forms IV and IVa are medium-heat appliances, all of which are intended to be flue connected to suitable chimneys

Gas-, gas-oil-, and oil-fired boiler assemblies Listed for Forms XII and XIIa and those Listed for Form III and IIIa equipped with draft hoods are low-heat gas appliances suitable for venting to Type B vents for gas appliances

Solid-fuel-fired boiler assemblies are intended for installation on the type of floor and with clearances to combustible construction from sides, rear, front and chimney connector not less than indicated on the boiler assembly. The chimney connectors should be connected to a chimney suitable for use with residential type and building heating appliances that burn solid fuel.

Solid-fuel-fired boiler assemblies are intended for installation on the type of floor and with clearances to combustible construction from sides, rear, front and chimney connector not less than indicated on the boiler assembly. The chimney connectors should be connected to a chimney suitable for use with residential type and building heating appliances that burn solid fuel.

Waste-heat-recovery boiler assemblies are intended for installation on the type of floor and with clearances to combustible construction from sides, rear, front and chimney connector not less than indicated on the boiler assembly. The chimney connector should be connected to a suitable chimney.

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Field-erected Boiler Assemblies (KVQE)

USE AND INSTALLATION

This category covers gas-, oil-, and gas-oil-fired boiler assemblies intended to be assembled in the field by qualified service personnel.

By design, the boiler consists of factory-built subassemblies or segments (as described below) and is furnished with appropriate controls and detailed instructions to accommodate assembly and installation, and markings pertaining to clearances, types of adjacent surfaces, and proper vent installation, in addition to the appropriate NFPA standards, the "International Mechanical Code," and/or the "Uniform Mechanical Code," as applicable, and local codes and regulations.

Factory-built subassemblies or segments consist of, but are not limited to:

- pressure vessel
- combustion chamber
- tube sheets: front, rear and intermediate as required
- flue tubes
- front and rear smoke boxes
- rear-access plug
- burner-mounting plug
- boiler-mounting base
- steel casing and insulation package
- all necessary pressure-vessel tappings, manways, hand-holds
- carton(s) containing required waterside controls
- carton(s) containing sufficient amount of welding rod, flexible and/or rigid steel conduit and appropriate connectors, sufficient amount of wiring for connection of waterside controls (may be a wiring harness), electrical connectors, paint, labels and instruction plates

The boiler-pressure vessel is required to be designed, assembled, tested and inspected in accordance with the requirements of Section I or Section IV of the "ASME Boiler and Pressure Vessel Code." Conformance with the code is determined by application of the "H" or "S" stamp and, if applicable, the "A" symbol stamp on the appropriate part of the boiler assembly.

Field-erected Boiler Assemblies (KVQE)—Continued

The boiler may be furnished either with an integral burner or intended for installation with a factory-built burner to accommodate the boiler as indicated in the individual Listings.

Field-erected boilers undergo a final inspection following completion of field assembly, ASME code-required testing and inspection, and operational testing. The inspection covers all points required by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted with regard to the inspection of field-erected boiler assemblies.

RELATED PRODUCTS

See Gas-fired Boiler Assemblies (KVTR), Oil-fired Boiler Assemblies (KWUX) and Burner Assemblies with Reduced Emissions (KXPU).

ADDITIONAL INFORMATION

For additional information, see Boiler Assemblies (KVFT), Heating Appliances (KTCR) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2106, "Field Erected Boiler Assemblies."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names and information as appropriate:

- (A) "Gas-fired (or Oil-fired or Gas-Oil-fired) Field-erected Boiler Assembly. For Use With Integral Primary Safety Controls."
 (B) "Field-erected Boiler Assembly. For Use Only With [Company Name] Listed Gas (or Oil or Gas-Oil) Burner Model(s) ____ Max Input Gas ____ BTU Per Hour (Oil ____ Gals. Per Hour). Refer to Burner Label for Control and Fuel Specifications."

A field-erected gas-, oil-, or gas-oil-fired boiler assembly that includes the burner as an integral part of the front head assembly bears a Listing Mark with the product name and information similar to (A).

A field-erected boiler assembly designed for installation with a Listed burner bears a Listing Mark with the product name and information similar to (B), which covers the boiler only. The burner bears a separate Listing Mark as described for gas burners (see KXWT), oil burners (see KYXZ) or gas-oil burners (see KYKR). The proper assemblies of boilers and burners to make unit assemblies are as specified in the boiler Listing Mark.

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HEATING AND COOLING EQUIPMENT (LZFE)

GENERAL

This category covers various types of heating and cooling equipment typically used for space conditioning.

Individual categories following the **GENERAL INFORMATION** section below are identified for each type of equipment. Not all statements in **GENERAL INFORMATION** are applicable to all types of equipment covered under this category; only the statements that are identified are applicable. Refer to the individual categories for the general information that is applicable.

Wiring Termination Provisions

For permanently connected equipment, the wiring termination provisions are based on tests during product investigation, and Table 310.16 of ANSI/NFPA 70, "National Electrical Code" (NEC) as follows:

- 75°C insulated conductors at the 75°C ampacities.
- 90°C insulated conductors at the 75°C ampacities in which case the equipment is marked for 90°C conductors.
- Insulation temperature rating of 75 or 90°C and wire size as marked on the unit.

Also see **IV. INSTALLATION REQUIREMENTS** (Appliance and Utilization Equipment Terminations) under Electrical Equipment for Use in Ordinary Locations (AALZ) and **VIII. ELECTRICAL INSTALLATIONS** under Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

GENERAL INFORMATION**Product Types**

1. The following defines the types of systems covered in the individual categories below:

- Self-contained** — Refrigeration system in one section, factory assembled, with refrigerant charge and tested for leaks.
- Compressor Unit** — Includes one or more compressors with associated

controls and wiring, and may also include a receiver. These units are intended for field connection to a remote evaporator, unit cooler or fan-coil unit, and to a remote condenser having a marked working pressure not less than designated by the marking on the unit data plate. (The term is applicable both to refrigeration equipment of any size and also to air conditioning equipment. The term "air conditioning systems equipment, compressor unit" is used for air conditioning equipment rated over 135,000 Btu/h.)

C. **Compressor Condenser Unit** — Includes one or more compressors and condensers with interconnecting refrigerant piping and with associated controls and wiring. These units are intended for field connection to a remote evaporator, unit cooler or fan-coil unit. (The term is applicable to air conditioning systems equipment only.)

D. **Compressor-Evaporator (Cooler) Unit** — Includes one or more compressors and evaporators (coolers) with interconnecting refrigerant tubing or piping and with associated controls and wiring. The unit is factory assembled and tested for leaks. The refrigerant type is marked on the unit and the operating refrigerant charge may or may not be provided as indicated on the unit nameplate.

These units are intended for field connection to a remote condenser having a marked working pressure not less than designated by the marking on the unit data plate. (The term "compressor-evaporator" is applicable to air conditioning systems equipment and special-purpose air conditioners, and the term "compressor-cooler" is applicable to liquid chillers.)

E. **Compressor Evaporator/Condenser** — Refrigeration system in two sections, one including the compressor and the evaporator and the other, the condenser. The sections are intended to be installed remote from each other. The interconnecting refrigerant tubing may or may not be provided. The operating refrigerant charge may or may not be provided, as indicated on the compressor evaporator unit nameplate. Each section is tested for leaks. (The term is applicable to central cooling air conditioners and special-purpose air conditioners.)

F. **Condensing Unit/Evaporator (Outdoor/Indoor Unit)** — Refrigeration or air conditioning system in two sections, the condensing unit (or outdoor) section including the compressor and condenser and the other section the evaporator (indoor section). The sections are intended to be installed remote from each other. The interconnecting refrigerant tubing may or may not be provided. The operating refrigerant charge may or may not be provided, as indicated on the condensing unit nameplate. Each section is tested for leaks. (The term "condensing unit/evaporator" is applicable to central cooling air conditioners and special-purpose air conditioners, and the term "outdoor/indoor unit" is applicable to heat pumps.)

G. **Heating, Cooling and Ventilating Equipment** — Intended for use as part of a complete system and, when installed, may be associated with other equipment and components that are separately Listed. Unless indicated in the individual Listings for the other equipment, this equipment has not been investigated for operation when combined with other Listed equipment in a complete system assembled in the field.

H. **Condensing Unit** — Includes one or more compressors and air- or water-cooled condensers with interconnecting refrigerant piping and with associated controls and wiring, and may also include a receiver. These units are intended for field connection to a remote evaporator, unit cooler or fan-coil unit. (Same as "C" above, except the term is applicable to refrigeration equipment or to air conditioning equipment of any size.)

2. Heating and cooling equipment of the unitary type consists of one or more factory-built sections. If the equipment is provided in two or more sections, each such section is designed for field interconnection with a matched section(s) to make the heating and/or cooling equipment. Equipment provided in two or more sections is either marked to identify the appropriate sections for proper installation, or the designations of the sections comprising the assembly are shown in the individual Listings. Where so designated, a separately Listed electric central heating furnace, fan-coil unit or fan unit may serve as a portion of the assembly.

3. Listed equipment is rated 600 V or less. Centrifugal type units as identified in the individual Listings are rated 7200 V or less.

Installation Codes

4. This equipment is intended to be installed in accordance with the requirements of the NEC.

5. Equipment to be connected to an air-duct system is intended for installation in accordance with the "International Mechanical Code," "International Residential Code," "Uniform Mechanical Code," ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," or ANSI/NFPA 90B, "Installation of Warm Air Heating and Air-Conditioning Systems."

6. Equipment with a gas-, oil-, or gas-oil-fired burner(s) is intended to be installed in accordance with appropriate National Fire Protection Association standards, including ANSI/NFPA 31, "Installation of Oil-Burning Equipment," ANSI Z223.1/NFPA 54, "National Fuel Gas Code," ANSI/NFPA 58, "Liquefied Petroleum Gas Code," or "International Fuel Gas Code."

7. For equipment intended to be installed in mobile homes, reference should be made to 24CFR3280, "Manufactured Home Construction and Safety Standards."

8. For equipment intended to be installed in recreational vehicles, reference should be made to ANSI/NFPA 1192, "Recreational Vehicles."

9. Equipment is marked with the refrigerant type used and some units may employ alternative refrigerants that are not currently listed in ANSI/ASHRAE 15, "Safety Standard for Refrigeration Systems," but are included in ANSI/ASHRAE 34, "Designation and Safety Classification of Refrigerants." The use of these alternative refrigerants resulted from environmental restrictions on some refrigerants currently listed in the code. Using requirements as applied to specified refrigerants in ANSI/ASHRAE 15, UL's Listing Reports (available from the manufacturer) identify installation requirements applicable to the alternative refrigerants in the same manner as shown in ANSI/ASHRAE 15 for currently used refrigerants.

The refrigerants are classified A1 or A1/A1 by ANSI/ASHRAE 15 and have been determined to be nonflammable or practically nonflammable in accordance with the requirements in ANSI/UL 2182, "Refrigerants."

Wiring Diagrams

10. The proper method of electrical installation (number of branch circuits, control wiring connections, etc.) is shown on the wiring diagram and/or marking attached to the equipment.

Units Used with Duct Heaters

11. Unless otherwise indicated in the individual Listings, Listed duct heaters that may be installed in conjunction with the equipment covered in the Listings should be installed at least 4 ft downstream from the equipment.

Field-installed Accessories

12. Heating and cooling equipment investigated for use with Listed field-installed accessories, such as electric resistance heaters (including duct heaters), is specifically indicated in the individual Listings. See Accessories, Air Conditioning Equipment (ABFY) and Duct Heaters, Electric (KOHZ).

13. Units investigated for use with field-installed steam, hot water, or refrigerant coils or with electric resistance heaters (including Listed accessories or duct heaters as noted in paragraph 11 above) are marked to so indicate.

Electric Heat Considerations

14. Units that incorporate factory- or field-installed electric resistance heaters are identified in the individual Listings.

Field-installed electric resistance heaters that have been investigated for use with the Listed equipment at the time of Listing, are identified on the heating and cooling equipment nameplate by manufacturer's name and part number, or are covered under Electric Heater Assemblies Classified for Use on Specified Equipment (LZPU).

15. Where a through-air clearance to combustible materials is required, the clearance is marked on the heating and/or cooling equipment and is designated in the individual Listings. The clearances are the minimum required to avoid overheating; additional clearances may be required for accessibility.

When zero clearance is specified, temperatures are measured directly on the unit cabinet with uninsulated sheet metal ducts and plenum attached. When clearances other than zero are specified, temperatures are measured on a wood test enclosure spaced at the specified clearances from the unit cabinet, ducts and plenum.

16. In heating and cooling equipment employing electric resistance heaters rated more than 48 A, the loads are subdivided so that each load does not exceed 48 A and is protected by overcurrent devices at not more than 60 A.

The overcurrent devices are either included as an integral part of the heating and cooling equipment or furnished as a separate assembly. If the overcurrent devices are furnished as a separate assembly, the unit is marked to specify that it is to be used with that particular separate assembly. For such separate assemblies specifically recognized for use with electric space heaters provided as part of this equipment, see **CONTROL PANELS FOR SPECIFIC ELECTRIC SPACE-HEATING EQUIPMENT** below. Other Listed separate assemblies, as referenced on a marking on the heating and cooling equipment, may also be used.

Unit Installation

17. Unless otherwise specified in the marking on the equipment, the unit may be installed on combustible flooring.

18. Attic type units are so indicated in the individual Listings. Such units are suitable for installation in an attic or comparable normally unoccupied location as designated by the marking or instructions provided on the unit.

19. Units/Sections suitable for outdoor installation are so marked and identified in the individual Listings either by the term "outdoor section" or by an appropriate footnote. Units/Sections not marked as suitable for outdoor installation are for indoor use only.

Motor Group Installation

20. In permanently connected units employing two or more motors or a motor(s) and other loads operating from a single supply circuit, the motor overload protective devices (including thermal protection for

motors) and other factory-installed motor components and wiring are investigated on the basis of compliance with the motor branch-circuit short-circuit and ground-fault protection requirements of Section 430.53(C) as referenced in Section 440.22 of the NEC. Such multimotor and combination load equipment is intended to be connected only to a circuit protected by fuses or a circuit breaker with a rating that does not exceed the value marked in the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses, circuit breakers or overcurrent devices, the circuit is intended to be protected only by the type of protective devices specified.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1995, "Heating and Cooling Equipment."

Alternatively, air conditioning systems, central cooling air conditioners (packaged and split system), heat pumps (packaged and split system), heat pump water heaters, accessories for heating and cooling equipment, accessories for air conditioning equipment, electric heater assemblies, dehumidifiers, and miscellaneous heating and cooling equipment single-phase appliances rated not more than 250 V, and all other appliances rated not more than 600 V are investigated to ANSI/UL 60335-1, "Safety of Household and Similar Electrical Appliances, Part 1: General Requirements," and ANSI/UL 60335-2-40, "Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers."

Other standards may also be used where specifically indicated in the individual categories below.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as shown in the following individual categories or in the individual Listings.

The Gas-fired Listing Mark of UL for gas-fired products includes the UL symbol with the words "GAS-FIRED" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, the product identity, and the standard designation as shown in the following individual categories or in the individual Listings.

ABSORPTION AIR CONDITIONING EQUIPMENT

GENERAL INFORMATION paragraphs 1A, 2, 3, 4, 5, 6, 9, 19 and 20 are applicable to this equipment.

This category covers equipment of the unitary type employing an absorption type refrigeration system, intended for commercial or domestic cooling, or heating and cooling of a liquid such as water or a water-antifreeze solution. This equipment is intended primarily, but not exclusively, for air conditioning application.

The direct energy source for cooling and heating is a hot fluid (such as gas, liquid or steam) as obtained from a source such as a solar-heat system or waste-heat, and/or gas-, oil-, or gas-oil-fired burners. Absorption air conditioning equipment provided with gas-, oil-, or gas-oil-fired burner(s) as the direct energy source for cooling and heating is covered under Absorption Air Conditioning Equipment (KTFV).

AIR CONDITIONING SYSTEMS EQUIPMENT, SELF-CONTAINED UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COOLING PORTION OF SELF-CONTAINED UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMPRESSOR-EVAPORATOR UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMPRESSOR-CONDENSER UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMPRESSOR UNITS

GENERAL INFORMATION paragraphs 1A, 1B, 1C, 1D, 3, 4, 5, 6, 9, 10, 11, 12, 13, 15, 16, 17, 19 and 20 are applicable to this equipment.

This category covers equipment with a rated cooling capacity exceeding 135,000 Btu/h, intended for commercial or industrial central cooling applications. For equipment rated 135,000 Btu/h or less, see **AIR CONDITIONERS, CENTRAL COOLING or CONDENSING UNITS** below. For additional self-contained units incorporating gas-, oil-, or gas-oil-fired burners, see **HEATING AND COOLING UNITS** below.

Self-contained units and compressor-evaporator units may include heating means, including electric resistance heaters, gas-, oil-, or gas-oil-fired burners, or hot water or steam coils.

A gas-fired heating portion included in this category is for use only in the same manufacturer's specified air conditioning systems equipment as marked on the heating portion and as indicated in the individual Listings.

The basic standard used to investigate the refrigeration portion of the products in this category is ANSI/UL 1995. The basic standard used to

investigate the gas heating portion of the products in this category is ANSI Z21.47/CSA 2.3, "Gas-Fired Central Furnaces."

The Gas-fired Listing Mark is provided either on a Listed self-contained unit or on a Listed gas-fired heating section or portion of a Listed self-contained unit.

The Gas-fired Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Gas-fired Listing Mark for these products includes the UL symbol with the words "GAS-FIRED" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, the words "Gas Heating Portion," and the standard designation "ANS Z21.47(+), CSA 2.3(+)(++) Central Furn."

(+) Suffix letter of latest addendum if applicable

(++) Issue year of latest addendum or standard

AIR CONDITIONERS AND CENTRAL COOLING AIR CONDITIONERS

SECTIONS OF CENTRAL COOLING AIR CONDITIONERS ACCESSORIES FOR AIR CONDITIONERS

GENERAL INFORMATION paragraphs 1A, 1E, 1F, 2, 3, 4, 5, 7, and 9 through 20 inclusive are applicable to this equipment.

This category covers equipment of the unitary type for commercial or domestic applications.

Unitary air conditioners consist of one or more factory-made sections, as described under **GENERAL INFORMATION**. Unless so indicated in the individual Listings, the evaporator blower is provided as part of the assembly, and may be an integral part of the evaporator section or furnished as a separate section.

CONDENSING UNITS

COMPRESSOR UNITS

ACCESSORIES FOR CONDENSING UNITS ACCESSORIES FOR COMPRESSOR UNITS

ACCESSORIES FOR CONDENSING OR COMPRESSOR UNITS

GENERAL INFORMATION paragraphs 1B, 1H, 3, 4, 9, 13, 19 and 20 are applicable to this equipment.

This category covers units intended for refrigeration service of any Btu per hour capacity. For units intended primarily for air conditioning applications, see **AIR CONDITIONING SYSTEMS EQUIPMENT** (rated more than 135,000 Btu/h) or **CENTRAL COOLING AIR CONDITIONERS** above.

This equipment is intended to be installed in air conditioning and refrigeration systems.

Some condensing units or compressor units included in this category are intended for field connection to multiple refrigeration systems and include multiple condensing units, compressor units or compressors, with single or multiple condensers, with associated piping, controls, and wiring, mounted on a common frame or in a common housing.

The acceptability of operation of these units, when associated with other components of a complete system, has not been investigated.

These units are intended to be used only in systems with the specified refrigerant and operating at pressures not in excess of those indicated by the marked test pressures.

GENERAL-PURPOSE CONTROL PANELS FOR ELECTRIC SPACE-HEATING EQUIPMENT

CONTROL PANELS FOR SPECIFIC ELECTRIC SPACE-HEATING EQUIPMENT

GENERAL INFORMATION paragraphs 3 and 4 are applicable to this equipment.

This category covers electrical panels incorporating control and/or overcurrent devices intended specifically for remote use with electric space-heating equipment, including air conditioning equipment with electric resistance space heaters.

Overcurrent protective devices in these panels are intended to provide overcurrent protection in accordance with Section 424.22(C) of the NEC.

Unless otherwise specified in the manufacturer's installation instructions, these panels are intended to be mounted remote from the space-heating equipment, in a location where they will not be affected by heat or condensation from operation of the equipment.

The proper installation of these panels requires careful consideration of the individual manufacturer's installation instructions and wiring diagrams.

General purpose panels are not limited to use with specific makes and models of space-heating equipment. These panels are provided with installation instructions and wiring diagrams showing supply connections, connections to the space-heating equipment, and control-circuit connections to be completed at the time of installation.

General purpose panels containing only overcurrent devices or only magnetically operated switching devices are covered under Panelboards (QEU) and Industrial Control Equipment (NIMX), respectively.

Panels to be used only with specific Listed equipment are so identified and the equipment marked to require the particular panel. The installation instructions and wiring diagrams for these panels may be provided with the panel or may be provided only with the Listed space-heating equipment.

For control panels for specific electric space-heating equipment, see the equipment nameplate and installation instructions.

DEHUMIDIFIERS

GENERAL INFORMATION paragraphs 1A, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 and 20 are applicable to this equipment. This category covers duct-mounted and permanently connected, self-contained household, commercial and industrial dehumidifiers for use in removing moisture from the air. These dehumidifiers employ hermetic refrigerant motor-compressors and may also incorporate electric air heaters.

ELECTRIC CENTRAL HEATING FURNACES

SECTIONS OF ELECTRIC CENTRAL HEATING FURNACES

GENERAL INFORMATION paragraphs 2, 4, 5, 7, 8, 9, 15, 16 and 20 are applicable to this equipment.

This category covers electrically operated central heating furnaces intended for use in space-heating applications in homes and other types of buildings, including mobile homes and recreational vehicles, as indicated in the manufacturer's installation instructions.

Warm-air furnaces have provision for connection to a duct system, except furnaces intended only for installation in a single-story residence need not have provision for connection of a return air duct.

Each electric central heating furnace is provided with an individual marking and instructions. If a noncombustible floor material is required, the necessary clearances to combustible constructions and proper installation in an alcove or closet are specified in the marking and/or instructions.

Furnaces consist of one or more factory-built sections. Equipment provided in more than one section is designed for field interconnection of matched sections to make the complete assembly. The individual sections that comprise the assembly are identified in the individual Listings and by a cross-reference marking on at least one of the sections.

Furnaces investigated for use with a field-installed refrigerant coil are so identified in the individual Listings, and the refrigerant coil(s) for such use are identified by a marking on the furnace. Tests of furnaces with these field-installed coils intended for cooling, or with integral factory-installed coils intended for cooling, have indicated no adverse effects on the furnace.

The assembly of a furnace with a field- or factory-installed refrigerant coil to a condensing unit of a central cooling air conditioner has been investigated only for those specific combinations identified in the individual Listings as "Air Conditioners, Central Cooling," or for those specific condensing units identified by a marking on the furnace.

The assembly of a furnace with a field- or factory-installed refrigerant coil to an outdoor section of a heat pump has been investigated only for those specific combinations identified in the individual Listings as "Heat Pumps." The effect of refrigerant heating on the furnace has not been investigated for other combinations.

ENVIRONMENTAL AIR TERMINAL UNITS

GENERAL INFORMATION paragraphs 1G, 3, 4, 5, 9, 10, 11, 12, 13, and 15 through 20 inclusive are applicable to this equipment.

This category covers fixed appliances that include a motor-operated fan or blower with or without electric resistance heaters. The appliances are intended to be installed in accordance with the manufacturer's installation instructions in plenums above hung (suspended) ceilings where the inlet air to the appliance is taken from this plenum space in accordance with Section 300.22(C) of the NEC.

The air outlet may be free discharge or be ducted to ceiling diffusers.

FAN-COIL UNITS

SECTIONS OF FAN-COIL UNITS

ACCESSORIES FOR FAN-COIL UNITS

GENERAL INFORMATION paragraphs 1G, 2, 3, 4, 5, and 9 through 20 inclusive are applicable to this equipment.

This category covers appliances that include a motor-operated fan or blower together with a cooling coil, a heating coil, or both, and may also include an electric heater. The fan or blower is designed to recirculate air or to draw in outside air, or both. The coil may be designed for refrigerant cooling, for refrigerant heating, for chilled water cooling, for hot water heating, for steam heating, or for combinations of these functions.

A fan-coil unit is intended to be piped to a remote source of heat, of cooling, or of both. Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to connection to water supply lines.

Equipment intended for use with hot water is marked for a maximum inlet water temperature.

Equipment intended for use with steam is marked for a maximum inlet steam pressure.

A fan-coil unit containing a refrigerant coil that has been additionally investigated as part of a specific split-system cooling air conditioner, special-purpose air conditioner or heat pump, is also identified as part of that system in the individual Listings as "Air Conditioners, Central Cooling," "Air Conditioners, Special Purpose" or "Heat Pumps."

A fan-coil unit, as covered by these requirements, may be designed for free delivery of air to the room or may be provided with means for duct connection. Representative types include floor-mounted, wall-mounted, ceiling-hung, and wall- or ceiling-insert (built-in) units.

A room-type unit is designed to circulate air to the conditioned space directly, or by means of duct work having a static-pressure drop not exceeding 0.05 in. of water.

Units that are similar to fan-coil units with electric resistance heaters, but not provided with a refrigerant, steam or water coil, are identified in the individual Listings as "Room Fan Heater Units."

FAN UNITS

GENERAL INFORMATION paragraphs 1G, 3, 4, 5, 9, 10, 12, 13, and 15 through 20 inclusive are applicable to this equipment.

This category covers equipment intended to be connected to a duct system that supplies conditioned air for environmental heating and/or cooling. The units consist of a motor-operated fan or blower and may have air control dampers. The units may be thermostatically operated by integral or remote controls. The units do not include factory-installed heat exchangers or other integral heating or cooling means.

Fan units with field-installed heater accessories as detailed in paragraph 12 under **GENERAL INFORMATION** are the equivalent of "Electric Central Heating Furnaces."

Units intended for use in duct systems with air temperatures exceeding normal room ambient temperature are marked with the maximum inlet air temperature rating.

Other types of fans for duct connection are covered under Fans, Electric (GPWW) and Ventilators, Power (ZACT).

HEAT PUMPS**SECTIONS OF HEAT PUMPS****ACCESSORIES FOR HEAT PUMPS**

GENERAL INFORMATION paragraphs 1A, 1F, 2, 3, 4, 5, 7, and 9 through 20 inclusive are applicable to this equipment.

This category covers reverse cycle unitary air conditioning systems for comfort heating and cooling (or for comfort heating only), if so indicated in the individual Listings.

HEAT PUMP WATER HEATERS**SECTIONS OF HEAT PUMP WATER HEATERS****ACCESSORIES FOR HEAT PUMP WATER HEATERS**

GENERAL INFORMATION paragraphs 2, 3, 4, 9, 10 and 20 are applicable to this equipment.

This category covers products intended to heat water utilizing the heat of rejection from a mechanical refrigeration system and optional accessories for these products. These products are designed to restrict the outlet water temperature to a maximum of 85°C (185°F) under normal operation conditions and to a maximum of 99°C (210°F) under abnormal conditions.

These units may include an integral storage tank or may be designed for connection to a separate tank and may also include electric resistance heaters to heat the water. For those units that include an integral tank, see Water Heaters, Household, Storage Tank (KSDT) for additional information.

HEATING AND COOLING UNITS**COOLING PORTIONS OF HEATING AND COOLING UNITS**

GENERAL INFORMATION paragraphs 1A, 3, 4, 5, 6, 9, 10, 15, 19 and 20 are applicable to this equipment.

This category covers self-contained assemblies manufactured for installation as a package. They include all the necessary components needed for both heating and cooling. Heating is by gas-, oil-, or gas-oil-fired burner(s), and by incorporating a heat pump system. Cooling and heat-pump heating is by mechanical refrigeration with any rated cooling/heating capacity.

The information pertaining to safe placement is indicated in the individual Listings.

The name and amount of refrigerant, test pressure, and electrical rating appear on the unit.

A gas-fired heating portion included in this category is for use only in the same manufacturer's specified air conditioning or heat pump systems equipment as marked on the heating portion and as indicated in the individual Listings.

The basic standard used to investigate the gas heating portion of the products in this category is ANSI Z21.47/CSA 2.3, "Gas-Fired Central Furnaces."

The Gas-fired Listing Mark is provided either on a Listed heating and cooling unit or on a Listed gas-fired heating section or portion of a Listed heating and cooling unit.

The Gas-fired Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Gas-fired Listing Mark for these products includes the UL symbol with the words "GAS-FIRED" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, the words "Gas Heating Portion," and the standard designation "ANS Z21.47(+) CSA 2.3(+)-(++) Central Furn."

(+) Suffix letter of latest addendum if applicable

(++) Issue year of latest addendum or standard

LIQUID CHILLERS, SELF-CONTAINED UNITS**LIQUID CHILLERS, COMPRESSOR-COOLER UNITS****AIR CONDITIONING LIQUID CHILLERS****SECTIONS OF AIR CONDITIONING LIQUID CHILLERS**

GENERAL INFORMATION paragraphs 1A, 1D, 2, 3, 4, 6, 9, 10, 19 and 20 are applicable to this equipment.

This category covers equipment intended for cooling of liquid, such as water or water-antifreeze solutions. The equipment is intended primarily, but not exclusively for, air conditioning application.

Air conditioning liquid chillers rated 135,000 Btu/h or less are of the unitary type. Liquid chillers with a rated cooling capacity exceeding 135,000 Btu/h may be either self-contained units or compressor-cooler units.

Drinking water coolers, commercial processing water coolers, and other liquid chillers investigated only for commercial refrigeration applications other than air conditioning are covered under Refrigeration Equipment (SCER).

Absorption air conditioning equipment that utilizes hot fluid (such as gas, liquid or steam) as the direct energy source for cooling and heating is identified in the individual Listings as "Absorption Air Conditioning Equipment."

Absorption air conditioning equipment provided with a gas-, oil-, or gas-oil-fired burner(s) as the direct energy source for cooling and heating is covered under Absorption Air Conditioning Equipment (KTFV).

MECHANICAL DRAFT WATER COOLING TOWERS**ACCESSORIES FOR MECHANICAL DRAFT WATER COOLING TOWERS**

GENERAL INFORMATION paragraphs 1G, 3, 4, 9, 10, 19 and 20 are applicable to this equipment.

This category covers equipment intended for use with water-cooled air conditioning and refrigeration equipment. The water used as a cooling medium may contain antifreeze, and is circulated through the tower via either a finned tube assembly or a system that is open to the atmosphere. The tower includes a motor-driven fan or blower and may also include circulation pumps.

Equipment investigated for use with Listed accessories, such as pump assemblies, is marked to identify the accessories and is also identified in the individual Listings.

REFRIGERANT CONDENSERS

GENERAL INFORMATION paragraphs 3, 4, 9, 10, 19 and 20 are applicable to this equipment.

This category covers finned tube assemblies incorporating a motor driven fan that are intended to liquefy refrigerant vapor by removal of heat.

Evaporative or water-cooled devices are covered under Condensers, Refrigerant (SLSV).

ROOM AIR TERMINAL UNITS

GENERAL INFORMATION paragraphs 1G, 3, 4, 5, 9, 10, 12, 13, and 15 through 20 inclusive are applicable to this equipment.

This category covers units designed to be connected to the terminal end of a single duct or duct system supplying air from a remotely located air-handling unit for the purpose of providing heating, ventilation and/or cooling.

The unit types include floor-mounted, wall-mounted, ceiling-hung, and wall- or ceiling-insert constructions.

Units incorporating electric heat have an automatic resetting temperature limiting control that is intended to protect against abnormal operating conditions and, in addition, each unit is provided with a replaceable thermal cutoff or a manually resettable temperature limiting control. In addition to ANSI/UL 1995, the standard used to investigate units incorporating electric heat is ANSI/UL 1996, "Electric Duct Heaters."

The proper installation of these units requires careful consideration of the individual manufacturer's design characteristics, taking into consideration the volume of air passing through the units and the temperature of the input air.

The manufacturer's application and installation instructions furnished with each unit should be consulted to determine the factors appropriate to the particular installation including required distances between the unit and turns in the duct, changes in duct sizes, air filters, humidifiers, etc. Unless these instructions specify other distances for horizontals or upflow installations, 1) turns in the duct on the inlet side of the unit should be at least 4 ft from the unit, 2) turns in the duct on the outlet side of the unit should be at least 2 ft from the unit, and 3) changes in duct size, air filters, humidifiers, etc. should be located at least 4 ft from either side of the unit.

Units incorporating electric heat may have provision for interlocking the air supply and the electric element circuit.

Units may include provision for a coil designed for cooling by refrigerant or chilled water, or heating by steam or hot water, or for combinations of such coils.

ROOM FAN HEATER UNITS

GENERAL INFORMATION paragraphs 1G, 3, 4, 5, 9, 10, 11, 12, 13, and 15 through 20 inclusive are applicable to this equipment.

This category covers fixed appliances that include a motor-operated fan or blower and electric resistance heater, or an electrically-heated heat exchanger.

These appliances are designed to serve a single room or space. Included are units similar to fan-coil units with electric resistance heaters but which are not provided with a refrigerant, steam or water coil, and units similar

to air heaters, but which draw in air from outside the heated space. Air heaters are covered under Air Heaters, Room, Fixed and Location Dedicated (KKWS).

A room fan heater may be designed for free delivery of air to the room, or may be provided with a means for connection of a short extension duct. Representative types include floor-mounted, wall-mounted, ceiling-hung, and wall- or ceiling-insert (built-in) units.

Information concerning required installation clearances, etc. is designated in markings and/or installation instructions as indicated under **GENERAL INFORMATION**. This information also appears in the individual Listings.

SPECIAL-PURPOSE AIR CONDITIONERS

SECTIONS OF SPECIAL-PURPOSE AIR CONDITIONERS

ACCESSORIES FOR SPECIAL-PURPOSE AIR CONDITIONERS

GENERAL INFORMATION paragraphs 1A, 1D, 1E, 1F, 2, 3, 4, 9, 10, 12, 15, 16, 17, 19 and 20 are applicable to this equipment.

This category covers equipment designed for special purposes, such as environmental control of computer rooms.

This equipment consists of one or more factory-made sections, as described under **GENERAL INFORMATION**. Unless so indicated in the individual Listings, an evaporator blower is provided as part of the assembly, and may be an integral part of the evaporator section or be furnished as a separate section.

Computer-room air conditioners are intended for installation in accordance with ANSI/NFPA 75, "Fire Protection of Information Technology Equipment." These air conditioners are generally installed on the raised floors of computer rooms and have not been investigated for connection to ducts unless so specified in the individual Listings.

Factory-installed electric heaters and humidifiers have been investigated for this application.

VENTILATING UNITS

SECTIONS OF VENTILATING UNITS

GENERAL INFORMATION paragraphs 1G, 3, 4, 5, 9, 10, 11, 12, 13, and 15 through 20 inclusive are applicable to this equipment.

This category covers units that consist of electric resistance heaters and a motor-operated blower. The units may also incorporate means for evaporative cooling. These units are intended to supply heated and/or cooled air to commercial and industrial buildings from which air is being exhausted by other equipment. There is no provision for return-air circulation on these units.

Information concerning required installation clearances, etc. is designated in markings and/or installation instructions as indicated under **GENERAL INFORMATION**. This information also appears in the individual Listings.

MISCELLANEOUS HEATING AND COOLING EQUIPMENT

GENERAL INFORMATION paragraph 4 is applicable to this equipment.

This category covers miscellaneous heating and cooling equipment.

HEATING AND COOLING EQUIPMENT ACCESSORIES

GENERAL INFORMATION paragraph 4 is applicable to this equipment.

This category covers accessories intended for installation only on Listed heating and cooling equipment as designated in the individual Listings of the equipment and accessories. The accessories are intended primarily for field installation, but may be factory installed.

The equipment on which these accessories may be field installed is marked to indicate that it is Listed for use with the specific accessory as designated by model, catalog number, part number, etc. in this category. Markings on the equipment also indicate any changes in the equipment ratings with the accessory installed.

Information concerning field wiring connections, mounting location, installation clearances, etc., are marked on the accessory, and/or in detailed installation instructions accompanying each accessory.

RELATED PRODUCTS

Products Verified for energy efficiency are covered under Heating and Cooling Equipment Verified for Energy Efficiency (ZWQL).

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DUCTLESS HEATING AND COOLING EQUIPMENT, LARGE, OPEN BUILDING (LZPG)

GENERAL

This category covers ductless heating and cooling equipment intended to serve a single, large, open area, such as a warehouse. These are encased assemblies designed as a unit and intended as the prime source of heating, cooling and dehumidification.

INSTALLATION

This equipment is rated 600 V ac or less and is intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

Ductless Heating and Cooling Equipment, Large, Open Building (LZPG)—Continued

Ductless heating and cooling equipment is custom built to the customer's specifications. This equipment may be installed in the conditioned airspace or outdoors; when installed outdoors, provisions, such as a short duct, are provided for serving the adjacent space. This equipment has a heating range from 10,000 to 18,000,000 Btu's, a cooling capacity range up to 1,000 tons, and an air circulation of 1,000 to 200,000 cfm. The heat sources include electric, gas, hot water, oil or steam. Each unit provided with electric, gas-fired or oil-fired heat incorporates integral limit controls intended to protect against abnormal operating conditions, which might arise from blocked inlets, blocked outlets, or fan failures. The limit control will not allow a discharge air temperature during all the normal, abnormal and back-up tests of 150°F (65.56°C).

After assembly on the production line, each unit will have tests conducted before it leaves the factory, and additional tests will be performed again once the unit has been installed at the site by a factory representative.

Ductless heating and cooling equipment is made up of three basic modules and optional extensions that are field erected in a stacked configuration. By design, the equipment consists of factory-built subassemblies or modules and furnished with appropriate controls and detailed instructions to accommodate assembly and installation with applicable codes.

The lowermost module is the **air base**, containing one or more propeller fans lying horizontal and, if specified, optional inlet filters. The air base unit has prewired power and control panel(s). These panels contain a power disconnect switch and motor starters, control relays and temperature controls. The selector controls and toggle switches are generally located inside of the control panel or vertically mounted on the side.

The second module is the **heat/cool section** that may consist of a cooling portion and/or a heating portion. The cooling portion consists of a refrigeration or chilled water heat exchanger coil. The heating portion may consist of one of the following options: (1) a Listed commercial/industrial gas burner (see KXWT), oil burner (see KYXZ) or gas-oil burner (see KYKR) with an air-to-air heat exchanger, (2) a Listed electric duct heater (see KOHZ), or (3) a hot water or steam heat exchanger. The boiler may be furnished either with an integral burner or intended for installation with a factory-built burner to accommodate the boiler as indicated in the individual Listings.

Normally the third module in the stacked configuration is the **air outlet** module; however, an **extension(s)** is frequently used to raise the discharge above items that surround the unit. The air outlet module is the uppermost module of the stacked configuration and may contain optional louvers that are capable of directing air in a specific direction.

This equipment is intended to employ other equipment and components, which are separately Recognized or Listed. Each piece of equipment has been factory tested prior to leaving the manufacturer's facility, and a factory-trained technician conducts the startup of each unit.

For fuel-fired heaters, the minimum clearance to combustible materials is 48 in. from the front side (burner side) and 18 in. from all other sides, including the top side. Fuel-fired heaters should not be mounted directly on a combustible floor.

For electric-duct-heater-supplied units, the minimum clearance to combustible materials is 48 in. from the front side (control panel side) and 18 in. from all other sides, including the top side. Electric-duct-heater-supplied units should not be mounted directly on a combustible floor.

Unless otherwise specified in the individual Listings and product marking, the unit may be installed on combustible flooring.

In units rated more than 48 A and employing electric resistance heaters, the loads are subdivided so that each load does not exceed 48 A and is protected at no more than 60 A. The overcurrent protective devices are either included as an integral part of the unit or are furnished as a separate assembly. If the protective devices are furnished as a separate assembly, the unit is marked to specify that it be used with that particular separate assembly. For such separate assemblies which are specifically Listed for use with electric space heaters provided as part of this equipment, see Control Panels, Remote, for Electric Duct Heaters (KMLW). Other Listed separate assemblies, as referenced on the equipment marking, may also be used.

In units employing two or more motors or a motor and an electric space heater operating from a single supply circuit, the motor overload protective devices (including thermal protection for motors) and other factory-installed motor-circuit components and wiring are investigated on the basis of compliance with the motor branch-circuit short-circuit and ground-fault protection requirements of Sec. 430.53(C) of the NEC. Such multimotor and combination load equipment is intended to be connected only to a circuit protected by fuses or a circuit breaker with a rating that does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses or "HACR Type" circuit breakers, the circuit is intended to be protected only by the type of protective device specified.

Equipment suitable for outdoor installation is so marked. Equipment not marked as suitable for outdoor installation is for indoor use only.

Wiring Termination Provisions

Ductless Heating and Cooling Equipment, Large, Open Building (LZPG)–Continued

For permanently connected equipment, the wiring termination provisions are based on tests during product investigation, and Table 310.16 of the NEC as follows:

1. 75°C insulated conductors at the 75°C ampacities.
2. 90°C insulated conductors at the 75°C ampacities, in which case the equipment is marked for 90°C conductors.
3. Insulation temperature rating of 75 or 90°C and wire size as marked on the unit.

Also see **INSTALLATION REQUIREMENTS** (Appliance and Utilization Equipment Terminations) under Electrical Equipment for Use in Ordinary Locations (AALZ) and **ELECTRICAL INSTALLATIONS** under Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

Installation Codes

Equipment with a gas-, oil-, or gas-oil-fired burner(s) is intended to be installed in accordance with appropriate National Fire Protection Association standards, including ANSI/NFPA 31, "Installation of Oil-Burning Equipment," ANSI Z223.1/NFPA 54, "National Fuel Gas Code," or ANSI/NFPA 58, "Liquefied Petroleum Gas Code."

Equipment is marked with the refrigerant type used and some units may employ alternative refrigerants that are not currently listed in ANSI/ASHRAE 15 (2004), "Safety Standard for Refrigeration Systems," but are included in ANSI/ASHRAE 34 (2004), "Designation and Safety Classification of Refrigerants." The use of these alternative refrigerants resulted from environmental restrictions on some refrigerants currently listed in the code. Using requirements as applied to specified refrigerants in ANSI/ASHRAE 15 (2004), UL's Listing Reports (available from the manufacturer) identify installation requirements applicable to the alternative refrigerants in the same manner as shown in ANSI/ASHRAE 15 (2004) for currently used refrigerants.

The refrigerants are classified A1 or A1/A1 by ANSI/ASHRAE 15 (2004) and have been determined to be nonflammable or practically nonflammable in accordance with the requirements in ANSI/UL 2182, "Refrigerants."

Wiring Diagrams

The proper method of electrical installation (number of branch circuits, control wiring connections, etc.) is shown on the wiring diagram and/or marking attached to the equipment.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1995, "Heating and Cooling Equipment."

Alternatively, single-phase appliances rated not more than 250 V, and all other appliances rated not more than 600 V are investigated to ANSI/UL 60335-1, "Safety of Household and Similar Electrical Appliances, Part 1: General Requirements," and ANSI/UL 60335-2-40, "Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers."

The basic standard used to investigate electric duct heaters is ANSI/UL 1996, "Electric Duct Heaters."

The basic standard used to investigate commercial/industrial gas burners is UL 795, "Commercial/Industrial Gas Heating Equipment."

The basic standard used to investigate oil burners is ANSI/UL 296, "Oil Burners."

The basic standards used to investigate domestic gas-oil burners with gas-fired inputs up to and including 400,000 Btu/h (117.23 kW) are the current edition and effective addenda thereto of ANSI Z21.17/CSA 2.7, "Domestic Gas Conversion Burners," and ANSI/UL 296.

The basic standards used to investigate commercial/industrial gas-oil burners with gas-fired inputs over 400,000 Btu/h (117.23 kW) are UL 795 and ANSI/UL 296.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ductless, Large, Open Building Heating and Cooling Equipment."

A separate Listing Mark is provided on Listed electric duct heaters (see KOHZ), commercial/industrial gas burners (see KXWT), oil burners (see KYXZ) or gas-oil burners (see KYKR) when employed in the heating mode of the ductless, large, open building heating and cooling equipment. Refer to the individual product categories for the appropriate Listing Marks.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Ductless Heating and Cooling Equipment, Large, Open Building (LZPG)–Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HEATING AND COOLING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (LZHA)

GENERAL

This category covers devices that include a motor-operated fan or blower together with a cooling coil, a heating coil, or both, and may also include an electric heater. The fan or blower is designed to recirculate air or to draw in outside air, or both. The coil may be designed for refrigerant cooling, for refrigerant heating, for chilled water cooling, for hot water heating, for steam heating, or for combinations of these functions.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 1995, "Heating and Cooling Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Heating and Cooling Equipment for Use in Hazardous Locations."

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HEATING, COOLING AND VENTILATING EQUIPMENT (LZLZ)

GENERAL

This category covers fan-coil units, plenum air-terminal units, room air-terminal units, room fan heater units, and other equipment intended for comfort heating, cooling and ventilation. This equipment is rated 600 V or less.

This equipment is intended for use as part of a complete system and, when installed, may be associated with other equipment and components that are separately Listed. This equipment has not been investigated from the standpoint of operation when combined with other equipment in a complete system assembled in the field, unless indicated in individual Listings for the other equipment.

Where a clearance is required to be maintained between the unit or attached duct work and combustible constructions, the clearance is designated in the individual Listings, and is also marked on the unit. Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet-metal ducts and plenum attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, ducts and plenum.

Unless specified otherwise in the individual Listings and product markings, the unit may be installed on combustible flooring.

Attic-type units are so indicated in the individual Listings. Such units are suitable for installation in an attic or comparable normally unoccupied location as designated by the product marking or instructions provided with the unit.

Separately shipped steam, hot water, or refrigerant coils suitable for field installation in conjunction with heating, cooling and ventilating equipment are identified by (1) the type or model designation of the coil, and (2) the type or model designation of the heating, cooling and ventilating equipment with which it is suitable.

In units rated more than 48 A and employing electric resistance heaters, the loads are subdivided so that each load does not exceed 48 A and is

HEATING, COOLING AND VENTILATING EQUIPMENT
(LZLZ)

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protected at not more than 60 A. The overcurrent protective devices are either included as an integral part of the unit or are furnished as a separate assembly. If the protective devices are furnished as a separate assembly, the unit is marked to specify that it is to be used with that particular separate assembly. For such separate assemblies which are specifically Listed for use with electric space heaters provided as part of this equipment, see **GENERAL PURPOSE CONTROL PANELS FOR ELECTRIC SPACE HEATING EQUIPMENT** under Heating and Cooling Equipment (LZFE). Other Listed separate assemblies, as referenced on the equipment marking, may also be used.

In units employing two or more motors or a motor and an electric space heater operating from a single supply circuit, the motor overload protective devices (including thermal protection for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of a compliance with the motor branch-circuit short-circuit and ground-fault protection requirements of Sec. 430.53(C) of ANSI/NFPA 70, "National Electrical Code." Such multimotor and combination load equipment is intended to be connected only to a circuit protected by fuses or a circuit breaker with a rating which does not exceed the value marked on the data plate.

PRODUCT MARKINGS

The marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses or "HACR Type" circuit breakers, the circuit is intended to be protected only by the type of protective device specified.

A unit to be connected to an air duct system is intended for installation in accordance with ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," or ANSI/NFPA 90B, "Installation of Warm Air Heating and Air-Conditioning Systems."

Equipment suitable for outdoor installation is so marked. Equipment not marked as suitable for outdoor installation is intended for indoor use only.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**ELECTRIC HEATER ASSEMBLIES
CLASSIFIED FOR USE ON SPECIFIED
EQUIPMENT (LZPU)****USE AND INSTALLATION**

This category covers electric heater assemblies intended for field installation on specific certified heating and cooling equipment (see Heating and Cooling Equipment [LZFE]) as identified by a marking on the electric heater assembly. The accessories are intended to be installed in accordance with the installation instructions packaged with the electric heater assembly. All parts and materials necessary to accomplish the installation are included with the electric heater assembly.

The Certification Mark indicates that the heater assembly has been investigated and found suitable for use in combination with the specified certified equipment and that this Mark supplements or supersedes any markings related to add-on heater assemblies marked on the certified equipment.

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling and Ventilating Equipment (LZLZ), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1995, "Heating and Cooling Equipment."

Alternatively, single-phase appliances rated not more than 250 V, and all other appliances rated not more than 600 V are investigated to ANSI/UL 60335-1, "Safety of Household and Similar Electrical Appliances, Part 1: General Requirements," and ANSI/UL 60335-2-40, "Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**ELECTRIC HEATER ASSEMBLY
FOR USE WITH * LISTED MODEL ****

Control No.

* Heating and cooling equipment Listee's name

** Heating and cooling equipment Listee's model number

*** Category of Listed equipment

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or

HEATING, COOLING AND VENTILATING EQUIPMENT (LZLZ)

**Electric Heater Assemblies Classified for Use on Specified
Equipment (LZPU)—Continued**

any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**HEAT-RECOVERY VENTILATORS, DUCTED
(LZTW)****USE AND INSTALLATION**

This category covers fixed equipment intended to remove air from buildings, replace it with fresh outside air and, in the process, transfer heat from the warmer to the colder air. The equipment is intended to be connected to duct systems that interconnect rooms or spaces within buildings for exhausting the indoor air and/or distributing the outdoor air. These ventilators are intended to be installed in accordance with the installation instructions packaged with the equipment and ANSI/NFPA 70, "National Electrical Code."

RELATED PRODUCTS

Nonducted heat-recovery ventilators are covered under Heat-recovery Ventilators, Nonducted (LZUU).

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling and Ventilating Equipment (LZLZ), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1812, "Ducted Heat Recovery Ventilators."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ducted Heat Recovery Ventilator" or "Accessory for Ducted Heat Recovery Ventilator."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**HEAT-RECOVERY VENTILATORS,
NONDUCTED (LZUU)****USE AND INSTALLATION**

This category covers stationary or fixed equipment intended to remove air from buildings, replace it with fresh outside air and, in the process, transfer heat from the warmer to the colder air. The equipment is not intended to be connected to a duct system, other than the short-duct runs necessary to bring air to and from the equipment.

RELATED PRODUCTS

Equipment designed to be connected to ducts that interconnect rooms or spaces within buildings for exhausting the indoor air and/or distributing the outdoor air is covered under Heat-recovery Ventilators, Ducted (LZTW).

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling and Ventilating Equipment (LZLZ), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1815, "Nonducted Heat Recovery Ventilators."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Non-Ducted Heat Recovery Ventilator."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HEATING AND HEATING-COOLING APPLIANCE ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (LZZA)

This category covers accessories for use in the assembly or installation of air conditioning, heating, cooling or refrigeration equipment, and similar applications.

CONTROLS, PRIMARY SAFETY FOR USE IN HAZARDOUS LOCATIONS (LZZG)

GENERAL

This category covers primary safety controls intended for use on gas-, gas-oil- or oil-burning appliances to program and monitor the operation of the burner. They are intended for household, commercial or industrial use in accordance with ANSI/NFPA 70, "National Electrical Code."

The "safety switch" section of a primary safety control may be a one-piece assembly or it may consist of a control chassis and different add-on sections, such as the base or cabinet and/or plug-in timers and amplifiers, as indicated in the individual Listings.

When a safety control consists of more than one section, the combination of sections specifically Listed is intended to be employed unless otherwise specified on the appliance marking.

PRODUCT MARKINGS

Primary safety controls are marked with the company's name or trademark, a distinctive catalog number, and the electrical ratings. Additional markings may be required based on the individual Listing Reports.

These products are marked with the following (or equivalent) statement: "Important: For Proper Operation Refer To Manufacturer's Installation Instructions To Determine The Primary Safety Control Sections That Comprise A Listed Primary Safety Control System."

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 372, "Automatic Electrical Controls for Household and Similar Use - Part 2: Particular Requirements for Burner Ignition Systems and Components."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Primary Safety Control for Use in Hazardous Locations" or "Section of Primary Safety Control for Use in Hazardous Locations." The words "Hazardous Locations" may be abbreviated "Haz. Loc."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HEATING AND HEATING-COOLING APPLIANCE ACCESSORIES (LZZX)

This category covers accessories for use in the assembly or installation of air conditioning heating, cooling or refrigeration equipment, and similar applications.

CONTROLS, LIMIT (MBPR)

GENERAL

This category covers controls that are essentially switches operated by a change in liquid level, pressure or temperature. They are intended primarily for use with air conditioning and heating equipment, although not limited to such specific applications. They are intended for household, commercial or industrial use in accordance with ANSI/NFPA 70, "National Electrical Code."

The limit controls may be provided as complete assemblies or they may consist of separate control and sensor sections as indicated in the individual certifications.

Controls, Limit (MBPR)—Continued

Controls for heating equipment — Controls intended for heating equipment are suitable for use with systems equipped with coal stokers, electric heaters, gas burners, or oil burners.

Limit controls and low-water shutoffs — Limit controls and low-water shutoffs should be of the type that opens the circuit when an unsafe condition is approached.

NFPA References — Limit controls are intended for operation of air conditioning, heating air cooling, and ventilating systems as recommended by the National Fire Protection Association for the installation of:

Air conditioning and ventilating systems of other than residence type (ANSI/NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems")

Residence-type warm air heating and air conditioning systems (ANSI/NFPA 90B, "Standard for the Installation of Warm Air Heating and Air-Conditioning Systems")

Oil-burning equipment (ANSI/NFPA 31, "Standard for the Installation of Oil-Burning Equipment")

Gas piping and gas appliances in buildings (ANSI/NFPA 54, "National Fuel Gas Code")

Control testing and specifications — Investigations are conducted to determine the suitability of the circuit scheme and of the intended method of installation and operation of the equipment for use in accordance with the applicable NFPA standards. The suitability and durability of the design and construction, the practicability of installation and use, and the accuracy and reliability of operation of the equipment are determined by appropriate examinations and tests.

When selecting controls, the temperature or pressure range desired and whether automatic or manual reset is required should be specified. The identification of this equipment and its primary function serves as a guide for specifying or ordering. The manufacturer's catalog should be consulted for detailed specifications.

Groups — Limit controls are grouped according to their primary functions as follows:

- **Group A** – Controls operated by a change in pressure intended primarily to limit the pressure in steam heating systems.

- **Group B** – Controls operated by a change in temperature intended primarily to limit the temperature in hot water heating systems and water heaters.

- **Group C** – Controls operated by a change in temperature intended primarily to limit the temperature in supply ducts of air conditioning and warm-air heating systems. May also be used to regulate air temperature in ovens and similar applications.

- **Group D** – Controls operated by a change in temperature intended to regulate the operation of air circulating fans in air conditioning and warm-air heating systems.

- **Group E** – Controls operated by a change in temperature for installation in the return air duct of air conditioning and ventilating systems to automatically shut off the fans when the temperature of the air in the system becomes excessive.

- **Group F** – Controls operated by a change in temperature for installation in the smoke pipe of stoker-fired heating plants to prevent feeding of green coal when the fire is out.

- **Group G** – Controls operated by a change in liquid level for boilers to prevent operation of the heating appliance in the event of low water in the boiler.

- **Group H** – Controls operated by a change in liquid level to regulate the delivery of feed water to boilers.

If a single control combines the functions of two groups its designation is a combination of the two groups. For example, a combination warm-air limit control and fan switch of the automatic reset type is classified under "Group C, D."

Manual reset controls — An "M1" or "M2" marking as a suffix to the group designation indicates the following manual reset functions are provided:

- **M1** – Controls that automatically reset to the "closed" position after normal operating conditions have been restored if the reset means is held in the "reset" position.

- **M2** – Controls that do not automatically reset to the "closed" position if the reset means is held in the "reset" position.

PRODUCT MARKINGS

Limit controls are marked with the company's name or trademark, a distinctive catalog number, and the electrical ratings. Additional markings may be required based on the individual certification reports.

RELATED PRODUCTS

**HEATING AND HEATING-COOLING APPLIANCE
ACCESSORIES (LZZX)**

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Controls, Limit (MBPR)—Continued

Controls for refrigeration and air conditioning (except remote, wall-mounted room thermostats) are covered under Controllers, Refrigeration (SDFY).

Electrical temperature controls for heating equipment, motor operators, and wall-mounted room thermostats are covered under Temperature-indicating and Regulating Equipment (XAPX).

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 353, "Limit Controls."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Limit Control" or "Section of Limit Control," or other appropriate product name as shown in the individual Listings.

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HOISTS (MSXT)

USE AND INSTALLATION

This category covers power-operated hoists of the overhead type, intended for material-lifting service using either chain or wire rope. Power hoists may include electric or pneumatic types of operation. They are intended to be suspended from a fixed member and may include trolleys for mobility.

All hoists are of the self-locking or braking type so that if the actuating force is removed, the load is retained in place. Load capacities are marked on the assemblies.

This category does not cover:

- Manual or power-operated portable hoists intended for use with scaffolds suspended by wire ropes
- Hoists for transporting people
- Manually operated chain hoists
- The fixed member or trolley that suspends the hoist

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1340, "Hoists."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Hoist" or "Hoist."

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HOISTWAY CABLE (MSZR)

GENERAL

This category covers hoistway cable, which is a single and multiple conductor cable for use in raceways in accordance with Article 620 of ANSI/NFPA 70, "National Electrical Code." Insulated conductors are 20 to 14 AWG inclusive. Multiple-conductor cable consists of insulated conductors cabled together with a suitable binder or sheath. The cable is rated 300 V or 600 V. The temperature rating, if so marked, is 90°C, otherwise it is 60°C. All cable complies with a vertical flame test.

PRODUCT MARKINGS

Hoistway cable is identified by the words "Hoistway Cable" printed on each insulated conductor and on the sheath, if provided.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

HOISTWAY CABLE (MSZR)

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 62, "Flexible Cord and Fixture Wire."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Hoistway Cable."

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**HOSPITAL SIGNALING AND NURSE
CALL ACCESSORY EQUIPMENT
(NBQW)**

USE AND INSTALLATION

This category covers equipment intended to be used separately or in combination to supplement a hospital nurse call signaling system. Its application is defined by the installation diagram covering the combination of the unit(s) with other units either employed for general hospital signaling use or used to form part of a hospital nurse call signaling system.

The equipment is intended to be installed in accordance with ANSI/NFPA 99, "Health Care Facilities."

Authorities Having Jurisdiction should be consulted before installation.

These units are not intended to be installed in areas where flammable anesthetics are likely to be present. Where equipment has been found suitable for use in oxygen-enriched atmospheres, it is so indicated in the individual certifications and marked on the device.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1069, "Hospital Signaling and Nurse Call Equipment."

UL MARK

The Signaling Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Hospital Signaling and Nurse Call Equipment" or "Hospital Signaling and Nurse Call Subassembly."

When applicable, the Security Mark is also included. The combined Signaling/Security Listing Mark consists of the Signaling Mark elements detailed above and the word "SECURITY" above the UL symbol. The product name is "Hospital Signaling and Nurse Call and Security Equipment" or "Hospital Signaling and Nurse Call and Security Subassembly."

Some of these products are also Listed under other Signaling and Energy Management, Information Technology or Telephone categories. When applicable, the product name may include "and Fire Alarm," "and General Signaling," "and Enclosed Energy Management," "and Information Technology" or "and Telephone," as appropriate (e.g., "Hospital Signaling and Nurse Call and Telephone Equipment").

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

- S - Security Equipment
- F - Fire Alarm Equipment
- HN - Hospital Signaling and Nurse Call Equipment
- G - General Signaling Equipment
- EM - Enclosed Energy Management Equipment
- IT - Information Technology Equipment
- T - Telephone Equipment

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HOSPITAL SIGNALING AND NURSE CALL EQUIPMENT (NBRZ)

USE

This category covers units employed for general hospital signaling use, or to form part of a hospital nurse call signaling system.

Where system units are identified as "supplementary," they are usually intended for connection to other manufacturer's noncertified equipment. These certified supplementary units have been investigated for their ability to provide isolation between the other noncertified equipment and the other certified system units.

Where system interconnection wiring is supervised for open, ground, and short faults, the supervised conductors/circuits are identified in the individual certifications.

Equipment suitable for use in shower stalls is identified in the individual certifications as "Shower Station."

Equipment suitable for use in oxygen-enriched atmospheres or by patients undergoing oxygen therapy is identified as such in the individual certifications. All other equipment should not be used in oxygen-enriched atmospheres or by patients undergoing oxygen therapy.

INSTALLATION

This equipment is intended to be installed in exact accordance with the instructions in the manufacturer's installation manual included with the equipment, and the requirements of ANSI/NFPA 70, "National Electrical Code," and ANSI/NFPA 99, "Health Care Facilities."

Authorities Having Jurisdiction should be consulted before installation.

To maintain leakage-current levels required by the applicable codes, it is intended that the interconnected wiring of the installed system be segregated (separate conduit) from that of systems which are not certified or certified to other categories not conforming to the leakage-current requirements of ANSI/NFPA 99.

INSTALLATION INSTRUCTIONS/MARKINGS

The individual system units covered under this category are separately certified. These units are tested as a typical system while wired in accordance with the manufacturer's installation instructions and wiring diagram. The individual certifications cover not only the system units but also the installation instructions and wiring diagrams that specify proper interconnection.

Modifications to the system in the field are limited to that described in the installation instructions for that system.

Only equipment certified under a specific system name should be considered as having been tested together and found to be compatible per the installation instructions and wiring diagram. Reference is made in the marking of the control unit to the wiring diagram showing complete information except when the installation wiring diagram is secured to the control unit.

These units are not intended to be installed in areas where flammable anesthetics are likely to be present. Where equipment has been found suitable for use in oxygen-enriched atmospheres it is so indicated in the individual certifications and marked on the device.

Other equipment connected to any system unit covered under this product category is not considered to be part of the system configuration unless the equipment in question is identified by the Listee name and model number in the installation instructions and covered under this category or Hospital Signaling and Nurse Call Accessory Equipment (NBQW).

OPERATIONS

System units identified as "fundamental" perform an essential/required operation whose primary function is to provide notification and/or reset/cancellation of a staff-initiated or patient-initiated call signal to alert the staff. The operations include all of the following:

- Call annunciation at a nurse's station (audible and visual),
- Call annunciation at the dome light,
- Call-placed indicator on the patient station (visual),
- Zone annunciation (audible and visual), and
- Call reset/cancellation.

Devices that perform fundamental operations are not investigated as being capable of performing supplementary operations.

A supplementary device is a device that is electrically isolated and not investigated as a fundamental device. A supplementary operation is an operation that is adjunct to the fundamental operation so that the failure of such will have no effect on the fundamental operation of the nurse call system.

Various system units may additionally annunciate fire alarm signals. These signals are supplementary only and these system units have not been investigated as fire-protective signaling system units.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1069, "Hospital Signaling and Nurse Call Equipment."

UL MARK

The Signaling Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Hospital Signaling and Nurse Call Equipment" or "Hospital Signaling and Nurse Call Subassembly."

When applicable, the Security Mark is also included. The combined Signaling/Security Listing Mark consists of the Signaling Mark elements detailed above and the word "SECURITY" above the UL symbol. The product name is "Hospital Signaling and Nurse Call and Security Equipment" or "Hospital Signaling and Nurse Call and Security Subassembly."

Some of these products are also Listed under other Signaling and Energy Management, Information Technology or Telephone categories. When applicable, the product name may include "and Fire Alarm," "and General Signaling," "and Enclosed Energy Management," "and Information Technology" or "and Telephone," as appropriate (e.g., "Hospital Signaling and Nurse Call and Telephone Equipment").

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

- S - Security Equipment
- F - Fire Alarm Equipment
- HN - Hospital Signaling and Nurse Call Equipment
- G - General Signaling Equipment
- EM - Enclosed Energy Management Equipment
- IT - Information Technology Equipment
- T - Telephone Equipment

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HYDROGEN GENERATORS (NCBD)

HYDROGEN GENERATORS, WATER-REACTION TYPE (NCBR)

USE AND INSTALLATION

This category covers products that generate hydrogen for use as a fuel by chemical reactions with water and other chemical substances (e.g., sodium borohydride and sodium hydride). These products are intended for use in accordance with ANSI/NFPA 70, "National Electrical Code." These products have an input rating of 600 V or less, and are intended for either portable or permanent connection to the source of supply and for installation in accordance with the manufacturer's installation instructions. These products are intended to be installed in accordance with ANSI/NFPA 55, "Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks," ANSI/NFPA 52, "Vehicular Fuel Systems Code," or the "International Fuel Gas Code," as applicable.

PRODUCT MARKINGS

These products are marked to indicate the manufacturer's name; model number; electrical input rating; IP rating; hydrogen output purity, temperature, capacity and pressure; and input fuel. Units are marked for residential use or nonresidential use as intended:

- **Residential** — Use in occupancies in which sleeping accommodations are provided for normal residential purposes and include all buildings designed to provide sleeping accommodations.
- **Nonresidential** — Use in locations other than residential, such as mercantile business, industrial and storage.

RELATED PRODUCTS

This category does not cover fuel cell systems or reversible fuel cell systems; such products are covered under Stationary Fuel Cell Systems (IRGZ), Fuel Cell Power Systems for Use in Industrial Trucks (IRGQ), Hand-held or Hand-transportable Fuel Cell Power Units and Disposable Fuel Cartridges (IRGU) or Fuel Cell Modules (IRGR2).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Flammable and Combustible Liquids and Gases Equipment (AAPQ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2264B, "Outline of Investigation for Hydrogen Generators Using Water Reaction."

Hydrogen Generators, Water-reaction Type (NCBR)—Continued

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Hydrogen Generator, Water-reaction Type."

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WATER-DRIVEN VENTILATORS FOR USE IN HAZARDOUS LOCATIONS (NCGV)

GENERAL

This category covers water-turbine-powered, positive-pressure ventilators intended for use in hazardous locations.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Positive Pressure Ventilation Fan for Use in Hazardous Locations" or "Water Driven Ventilator for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HYDROMASSAGE BATHTUBS (NCHX)

USE AND INSTALLATION

This category covers indoor hydromassage bathtubs (also known as whirlpool baths) rated 250 V or less, for residential and commercial use, for permanent connection to the building plumbing, and intended for installation and use in accordance with Article 680 of ANSI/NFPA 70, "National Electrical Code." They are intended for either permanent connection to the electrical supply or are provided from the factory with a maximum 3 ft. type SJ or equivalent service cord terminating in a grounding type attachment plug. A hydromassage bathtub may have provision for a maximum of two supply sources.

A hydromassage bathtub consists of a drainable tub, a recirculating pump and optional equipment such as lights, a heater, a control and an air blower. A bathtub may also be provided with an air-blower and no recirculating pump or with an integral shower unit.

This category also covers heaters intended to be installed after a hydromassage bathtub leaves the factory. These field-installed heaters are Listed as hydromassage bathtub accessories. They are provided with markings on the heater and on the heater packaging to indicate the hydromassage bathtub models with which they are suitable.

Hydromassage bathtubs and hydromassage bathtub accessory heaters are intended to be protected by a ground-fault circuit interrupter.

Double Insulation — Hydromassage bathtubs may utilize double insulated pumps. These pumps are marked "Double Insulated" or "Double Insulation." Double insulated pumps intended for permanent connection to the supply may or may not have provision to terminate an equipment grounding conductor. Cord-connected double insulated pumps may be provided with a power supply cord terminating in a nongrounding type attachment plug. Double insulated pumps are not provided with a pressure wire connector for equipotential bonding.

The physiological effect of using this equipment has not been determined. The suction fittings used in these hydromassage bathtubs have been investigated with respect to body and hair entrapment in accordance with ASME/ANSI A112.19.8M-1987.

INSTRUCTIONS/MARKINGS

Factory Configuration Information — Each hydromassage bathtub is provided with a marking on the wiring diagram, in the installation instructions or on a separate configuration sheet, to identify the factory-installed components of the unit. These components include pumps, controls, heaters, luminaires, and supply cords. This configuration marking and the installation instructions are intended to be available during installation and inspection.

Field-installed Options — Field-installed options that have been investigated and found to be suitable for addition to the unit are specified in the installation instructions. Hydromassage bathtubs intended for accessory heaters to be installed in the field are factory configured with fittings for this purpose. These bathtubs are marked "Suitable for Field-Installed Heater Accessory" and "Use only Accessory Heaters Marked for Use with This Bathtub."

RELATED PRODUCTS

Portable hydromassage equipment is covered under Personal Hygiene and Health Care Appliances (QGRZ). This category does not cover hydrotherapy tubs used in health care facilities. For prefabricated steam baths and showers, see Prefabricated Assemblies, Sections and Units (QQXX). For sauna and steam bath heating equipment, see Heaters, Sauna and Steam Bath (KPJV). Self-contained spas and hot tubs are covered under Self-contained Spas (WCZW).

For unjetted plastic bathtubs, shower stalls, and the like tested in accordance with the applicable ANSI Z124 series standards, see Plastic Plumbing Fixtures (QNNP).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1795, "Hydromassage Bathtubs."

ADJUNCT SERVICE

UL provides a service for the Classification of hydromassage bathtubs that not only meet the appropriate requirements of UL but also have been investigated in accordance with Standards or parts detailed below. These products are intended for installation and use in accordance with the applicable model plumbing code.

1. ASME/ANSI A112.19.7M-+, "Requirements for Whirlpool Bathtub Appliances"
2. Water retention test requirement from ASME/ANSI A112.19.7M-+ + Issue date of standard or latest addendum

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Hydromassage Bathtub" or "Hydromassage Bathtub Accessory."

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with standards or parts detailed below from the American National Standards Institute (ANSI). The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following marking: "ALSO CLASSIFIED IN ACCORDANCE WITH *," where "*" is one of the texts detailed below:

1. ASME/ANSI A112.19.7M-+
2. WATER RETENTION TEST REQUIREMENT FROM ASME/ANSI A112.19.7M-+ + Issue date of standard or latest addendum

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INDUSTRIAL CONTROL EQUIPMENT (NIMX)

This category covers the following devices:
 Electro-sensitive protective equipment
 Emergency stop devices
 Industrial control panels
 Industrial control switches
 Motor control centers
 Motor controllers over 1500 V
 Motor controller accessories over 1500 V

- Motor controllers
- Power circuit and motor-mounted apparatus
- Power conversion equipment (medium voltage)
- Programmable controllers
- Programmable safety controllers
- Protective relays
- Proximity switches

Enclosure Type ratings — Enclosed industrial control equipment is identified with an Enclosure Type designation and is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ). Only Enclosure Type designations associated with the UL Listing Mark have been certified by UL. Open-type components investigated for mounting through the wall of specific enclosure types are marked "Suitable for use on a flat surface of a Type ___ enclosure," or the equivalent, and are provided with instructions and mounting hardware.

Open-type equipment — Unless otherwise specified in the instructions or markings on the product, open-type industrial control equipment is intended for installation within enclosures supplied in the field.

Field-wiring connections — Industrial control equipment is for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Accessories — Industrial control equipment for which accessory kits are available for the field or distributor modification of the basic product or which may be assembled in many forms from separate components are marked to indicate the suitable accessories or separate components which may be used.

Coil ratings — Unless otherwise marked, the sealed volt-ampere rating of the operating coil circuit of a magnetically-operated industrial control device is as tabulated below. For a magnetically-operated industrial control device with an ac coil, the device is investigated for operation over a range of +10% and -15% of the rated control circuit voltage. For a magnetically-operated industrial control device with a dc coil, the device is investigated for operation over a range of +10% and -20% of the maximum rated control circuit voltage.

Marked Contact Rating of Device, Amperes	Maximum Coil Volt-Amperes
30 A or less	30 VA
50 A or less	75 VA
150 A or less	100 VA
300 A or less	125 VA

Voltage ratings — Industrial control equipment is marked with the maximum voltage rating for the intended loads. When the marked voltage rating is included in one of the voltage ranges tabulated below, the equipment has been investigated for use at the corresponding maximum voltage of the range:

Marked Voltage Rating of Equipment	Maximum Use Voltage
110 – 120	120
220 – 240	240
254 – 277	277
380 – 415	415
440 – 480	480
550 – 600	600

Frequency — Unless otherwise marked on the equipment, industrial control equipment is intended for use on alternating-current supply with a rated frequency of 50/60 Hz.

Load type — Unless otherwise marked on the equipment, an ampere rating assigned to industrial control equipment is considered to be a general-purpose rating for use with a load that is continuous or with an inrush current that does not exceed the ampere rating of the device. For other specific load types, the rating is followed by one of the following terms:

Marked Rating on Device	Intended Load Type
Amperes	General use
Amperes, resistive (or res.)	Resistive
Amperes, resistance	Heater load
Amperes, ballast	Electric discharge lamp magnetic ballast load
Amperes, electronic ballast	Fluorescent lamp electronic ballast load
Amperes or watts, tungsten	Incandescent lamp load
Code designation, volt-amperes	Coil, standard or heavy duty (pilot duty)
Amperes, kVar	Capacitor switching load, full load amperes
Hp	Motor load
FLA/LRA	Hermetic refrigeration compressor motor

Number of poles — Unless otherwise marked, an industrial control device rated for a single-phase load has been investigated for controlling a

single-phase load using one pole of the controller. A controller rated for a three-phase load has been investigated for controlling the three-phase load using two poles of the controller. For an industrial control device marked "break all lines" or the equivalent, such as by means of a wiring diagram, a switched pole is intended to be connected to each conductor supplying the load.

Number of phases — A marked rating for which the number of phases is not specified is considered to be for a single-phase circuit.

Ambient temperature rating — Unless otherwise specified on the product or on instructions provided with the product, enclosed industrial control equipment and open-type equipment, when installed in an enclosure, is intended for use in an ambient temperature of 0°C – 40°C (32°F – 104°F).

Surrounding air-temperature rating — Some open-type equipment is marked with a surrounding air-temperature rating. Such equipment is intended to be installed within an enclosure having sufficient volume and ventilation or is provided with additional cooling means such that while the equipment is in operation, the air immediately surrounding the equipment within the ultimate enclosure does not exceed the marked surrounding air-temperature rating.

Functional Safety and Electromagnetic Compatibility (EMC) — Unless specifically indicated in the Guide Information for each product category, the equipment listed above has not been subjected to investigation with respect to its use in applications involving functional safety or EMC.

Service equipment markings — Some industrial control equipment is suitable for use as service equipment and may be so marked. Such marking is part of the Listing Mark or is an integral part of other required markings.

Some industrial control equipment incorporates neutrals that are insulated from the frame or enclosure. Such units are marked "Suitable for Use as Service Equipment." Some industrial control equipment incorporates neutrals factory bonded to the frame or enclosure. Such units are marked "Suitable Only for Use as Service Equipment."

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ELECTRO-SENSITIVE PROTECTIVE EQUIPMENT (NIOZ)

GENERAL

This category covers electro-sensitive protective equipment (ESPE) for the safeguarding of machinery. ESPE is applied to machinery that presents a risk of personal injury, and is intended to provide protection by causing the machine to revert to a safe condition before a person can be placed in a hazardous situation.

SPECIAL CONSIDERATIONS

In addition to fire and electric shock hazards, these devices have been investigated for their safety-related performance features. ESPE is designated as conforming to the requirements for Type 2, 3 or 4 ESPE as shown in the individual Listings and as defined in ANSI/UL 61496-1, "Electro-Sensitive Protective Equipment, Part 1: General Requirements and Tests." In addition, the individual Listings identify products that also have been investigated to ANSI/UL 1998, "Software in Programmable Components," or IEC 61508-3, "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 3: Software Requirements."

The adequacy of the dimensions or configuration of the sensing zone and its disposition in relation to hazardous parts for any particular application has not been investigated as part of this category, nor what constitutes a hazardous state of any machine. The investigation of ESPE is restricted to the functioning of the ESPE, the means by which it monitors the condition of the machine, and how it interfaces with the machine controls.

The products covered in this category may be relevant to applications other than those for the protection of persons, for example for the protection of machinery or products from mechanical damage. In those applications additional requirements may be necessary, for example when the materials that have to be recognized by the sensing function have different properties from those of persons.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Active Opto-electronic Protective Devices (NIPF)**GENERAL**

This category covers electro-sensitive protective equipment (ESPE) for the safeguarding of machinery, employing active opto-electronic protective devices (AOPD) for the sensing function.

The sensing function is performed by opto-electronic emitting and receiving elements detecting the interruption of optical radiations generated, within the device, by an opaque object present in the specified detection zone.

This category does not cover AOPDs employing radiation at wavelengths outside the range 400 nm to 1,500 nm.

RELATED PRODUCTS

Electro-sensitive protective equipment (ESPE) for the safeguarding of machinery, employing active opto-electronic protective devices responsive to diffuse reflection (AOPDDR) for the sensing function is covered under Active Opto-electronic Protective Devices Responsive to Diffuse Reflection (NIPM).

Electro-sensitive protective equipment (ESPE) employing vision-based protective devices (VBPDs) for the safeguarding of machinery is covered under Active Opto-electronic Protective Devices Employing Vision-based Protective Devices (NIPJ).

ADDITIONAL INFORMATION

For additional information, see Electro-sensitive Protective Equipment (NIOZ), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 508, "Industrial Control Equipment," ANSI/UL 61496-1, "Electro-Sensitive Protective Equipment, Part 1: General Requirements and Tests," and ANSU/UL 61496-2, "Electro-Sensitive Protective Equipment, Part 2: Particular Requirements for Equipment Using Active Opto-Electronic Protective Devices (AOPDs)."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electro-sensitive Protective Equipment" (or "ESPE") or "Active Opto-electronic Protective Device" (or "AOPD"), or other appropriate product name as shown in the individual Listings.

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**Active Opto-electronic Protective Devices
Employing Vision-based Protective Devices
(NIPJ)****GENERAL**

This category covers electro-sensitive protective equipment (ESPE), employing vision-based protective devices (VBPDs) for the safeguarding of machinery.

The sensing function is performed by single-image sensing devices viewing one two-dimensional image against a passive pattern as the background and where the detection principle is blocking the view of the pattern.

RELATED PRODUCTS

Electro-sensitive protective equipment (ESPE) for the safeguarding of machinery, employing active opto-electronic protective devices (AOPD) for the sensing function is covered under Active Opto-electronic Protective Devices (NIPF).

Electro-sensitive protective equipment (ESPE) for the safeguarding of machinery, employing active opto-electronic protective devices responsive to diffuse reflection (AOPDDR) for the sensing function is covered under Active Opto-electronic Protective Devices Responsive to Diffuse Reflection (NIPM).

ADDITIONAL INFORMATION

For additional information, see Electro-sensitive Protective Equipment (NIOZ), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 508, "Industrial Control Equipment," IEC 61496-1, "Safety of Machinery - Electro-Sensitive Protective Equipment - Part 1: General Requirements and Tests," and IEC TR 61496-4, "Safety of Machinery - Electro-Sensitive Protective Equipment - Part 4: Particular Requirements for Equipment Using Vision Based Protective Devices (VBPD)."

Active Opto-electronic Protective Devices Employing Vision-based Protective Devices (NIPJ)–Continued**UL MARK**

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electro-sensitive Protective Equipment" (or "ESPE") or "Active Opto-electronic Protective Device Employing Vision-based Protection Devices" (or "AOPDVBD"), or other appropriate product name as shown in the individual Listings.

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**Active Opto-electronic Protective Devices
Responsive to Diffuse Reflection (NIPM)****GENERAL**

This category covers electro-sensitive protective equipment (ESPE) for the safeguarding of machinery, employing active opto-electronic protective devices responsive to diffuse reflection (AOPDDR) for the sensing function.

The sensing function is performed by opto-electronic devices which respond to the diffused reflection from an opaque object present in the specified detection zone of their incident light.

RELATED PRODUCTS

Electro-sensitive protective equipment (ESPE) employing active opto-electronic protective devices (AOPD) for the sensing function, for the safeguarding of machinery, is covered under Active Opto-electronic Protective Devices (NIPF).

Electro-sensitive protective equipment (ESPE) employing vision-based protective devices (VBPDs) for the safeguarding of machinery is covered under Active Opto-electronic Protective Devices Employing Vision-based Protective Devices (NIPJ).

ADDITIONAL INFORMATION

For additional information, see Electro-sensitive Protective Equipment (NIOZ), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 508, "Industrial Control Equipment," IEC 61496-1, "Safety of Machinery - Electro-Sensitive Protective Equipment - Part 1: General Requirements and Tests," and IEC 61496-3, "Safety of Machinery - Electro-sensitive Protective Equipment - Part 3: Particular Requirements for Equipment Using Active Opto-Electronic Protective Devices Responsive to Diffuse Reflection."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electro-Sensitive Protective Equipment" (or "ESPE") or "Active Opto-Electronic Protective Device Responsive to Diffuse Reflection" (or "AOPDDR"), or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EMERGENCY STOP DEVICES (NISD)**GENERAL**

This category covers emergency stop devices, including emergency stop units and emergency stop buttons, intended to be installed in a machine control system to perform a Category 0 or Category 1 stop function as defined in ANSI/NFPA 79, "Electrical Standard for Industrial Machinery." The emergency stop actuator provided in these devices is a self-latching type. These devices have been investigated for their functionality in addition to fire and electric shock safety.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are: ANSI/UL 508, "Industrial Control Equipment"

INDUSTRIAL CONTROL EQUIPMENT (NIMX)

Emergency Stop Devices (NISD)—Continued

UL 991, “Tests for Safety-Related Controls Employing Solid-State Devices”
ANSI/NFPA 79, “Electrical Standard for Industrial Machinery”
IEC 60947-5-5, “Low-Voltage Switchgear and Controlgear – Part 5-5: Control Circuit Devices and Switching Elements – Electrical Emergency Stop Device with Mechanical Latching Function”
EN 418, “Safety of Machinery – Emergency Stop Equipment, Functional Aspects – Principles for Design”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Emergency Stop Device,” “Emergency Stop Unit” or “Emergency Stop Button,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

INDUSTRIAL CONTROL PANELS (NITW)

GENERAL

This category covers industrial control panels, which are factory-wired assemblies of industrial control equipment, such as motor controllers, switches, relays and auxiliary devices. The panels may include disconnect means and motor branch-circuit protective devices. An industrial control panel does not include the controlled loads, including motors, luminaires, heaters, or utilization equipment.

An enclosed industrial control panel is comprised of the enclosure, all components located within the enclosure, and all components mounted to the walls of the enclosure.

An open industrial control panel is comprised of a mounting sub-panel and all components mounted to the sub-panel, and is intended for installation into an enclosure in the field.

This category also covers industrial control panel enclosures. The enclosures may contain ventilation openings, observation windows, conduit fittings, environmental control devices, or maintenance luminaires. Industrial control panel enclosures are intended to house open-type industrial control panels or individual items of industrial control equipment installed in the field.

Industrial control panels are intended for installation in accordance with Article 409 of ANSI/NFPA 70, “National Electrical Code” (NEC).

Unless otherwise marked, industrial control panels covered under this category are intended for general-use industrial applications for control of heaters, lighting, motors or pump loads, or a combination of these loads, and are intended for installation in accordance with Chapter 4 of the NEC.

Industrial control panels marked “Industrial Control Panel for Industrial Machinery” on the unit nameplate have been investigated to determine that they meet the requirements of ANSI/NFPA 79, “Electrical Standard for Industrial Machinery,” in addition to Article 670 of the NEC. Industrial control panels designated for control of industrial machinery may not be suitable for use with other equipment.

Industrial control panels marked “Flame Control Panel” on the unit nameplate contain controls for fossil fuel-burning equipment, such as incinerators, kilns, and drying ovens, intended for industrial applications. These control panels may additionally contain controls for other loads.

Industrial control panels marked “Crane Control Panel” or “Hoist Control Panel” on the unit nameplate contain controls for overhead cranes and hoists for industrial applications. These panels are intended for installation in accordance with Article 610 of the NEC and may not be suitable for use with equipment other than cranes and hoists.

Industrial control panels marked “Industrial Control Panel for Marine Use” on the unit nameplate are intended for use aboard vessels over 65 feet (19.9 m) in length. These panels have been investigated to determine that they meet the requirements of USCG Electrical Engineering Regulations Subchapter J (46CFR, Part 110).

Industrial control panels marked “Industrial Control Panel for Refrigeration Equipment” or “Industrial Control Panel for Air Conditioning Equipment” on the unit nameplate contain controls for hermetic refrigerant compressor motors for industrial applications. These control panels are intended for installation in accordance with Article 440 of the NEC. Industrial control panels designated for control of refrigeration equipment may not be suitable for use with equipment other than refrigeration equipment.

Industrial control panels marked for service equipment use may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected are identified by a marking, such as on a wiring dia-

INDUSTRIAL CONTROL EQUIPMENT (NIMX)

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Industrial Control Panels (NITW)—Continued

gram or on the equipment. Instructions are provided for on-site testing of the ground-fault protection at the time of installation.

Industrial control panels marked “Fountain Control Panel” on the unit nameplate are intended for control of permanently installed fountains or floating fountains. These control panels are intended for installation in accordance with Article 680 or 682 of the NEC.

Industrial control panels are not intended for installation in motor control center sections or units.

RATINGS

Industrial control panels are rated 600 V or less. Each power circuit output from the control panel is rated in current or power, voltage, and the intended load type, such as a motor. Each supply input to the industrial control panel is rated in full load amperes, rating of largest motor load, voltage, number of phases, and frequency. Each supply input is additionally provided with a short-circuit current rating indicating the maximum rms symmetrical amperes and voltage available at the input terminals of the industrial control panel or, for an industrial control panel not supplied with branch-circuit protection, the maximum rms symmetrical amperes and voltage available on the line side of the overcurrent protection installed in the field.

ENVIRONMENTAL RATINGS

Industrial control panel enclosures are marked with the enclosure type ratings for which they were investigated.

Enclosed industrial control panels are marked with an enclosure type rating. The type rating of the industrial control panel may differ from the rating of the basic enclosure due to the presence of components or assemblies installed through the enclosure walls by the manufacturer.

PRODUCT MARKINGS

Industrial control panels are marked with the electrical ratings for each source of supply to the panel. The panel or wiring diagram provided with the panel is marked with the electrical ratings of the intended load equipment, such as motors, heaters, lighting, or appliance loads. Industrial control panels are provided with a complete schematic diagram of the panel as built by the manufacturer. When the schematic wiring diagram includes components that are not supplied with the industrial control panel, such as remote control devices, motors or similar devices, a notation or similar means is used to identify such components. When additional installation instructions are provided on a separate drawing, a reference to the drawing containing the information is marked on the nameplate of the industrial control panel.

The nameplate of industrial control panels is marked with the short-circuit current rating for each supply as follows: “Short circuit current: ___ kA rms symmetrical, ___ V maximum,” or the equivalent.

SPECIAL CONSIDERATIONS

These control panels are investigated for electrical fire and shock hazards only. The investigation of industrial control panels does not include investigation of the adequacy of the control and protective devices to supervise the functioning of the controlled equipment.

Special relationships and investigations may be necessary for the proper operation of certain equipment, as noted below:

1. Control panels investigated for use in access control systems, which provide a means of regulating or controlling entry into an area, are covered under Access Control System Units (ALVY).
2. Industrial control panels investigated with air conditioning and refrigeration equipment are covered under Heating and Cooling Equipment (LZFB) or Specialty Refrigeration Equipment (SROT).
3. Industrial control panels investigated with industrial machinery are covered under Factory Automation Equipment (GPNY).
4. Flame control panels investigated with specific burner assemblies are covered under Commercial/Industrial Gas Burners (KXWT), Gas-Oil Burners (KYKR) or Oil Burners (KYXZ).
5. Fluid-handling systems consisting of industrial control panels, pumps, valves, gauges, and piping mounted to a structural base are covered under Packaged Pumping Systems (QCZZ).
6. Control panels investigated with equipment intended for use as part of a semiconductor manufacturing process are covered under Analysis and Measurement Equipment (TWLRL), Miscellaneous Semiconductor Manufacturing Equipment (TWTZ), Power Supplies, Semiconductor (TWWJ) or Semiconductor Manufacturing Equipment, Limited Production (TWWU).
7. Control panels investigated for use with flammable-liquid dispensing devices are covered under Control, Monitoring and Auxiliary Equipment (EQXX). Liquids with a flash point below 100°F are defined as flammable. Liquids with a flash point of 100°F and above are defined as combustible.
8. Control panels intended for use in motor control center sections or units are covered under Motor Control Centers (NJAV).

RELATED PRODUCTS

Enclosures for general-use electrical equipment or wiring are covered under Boxes, Junction and Pull (BGUZ) or Cabinets and Cutout Boxes (CYIV).

Industrial Control Panels (NITW)—Continued

Control panels intended for elevators, dumbwaiters, escalators, moving walks, inclined lifts and their associated equipment are covered under Elevator Control Panels (FQPB).

Control panels with connection to sensors or initiating devices to detect and activate emergency alarms are covered under Signal System Units (UDTZ).

Equipment for gas or vapor detection and intended for connection to emergency alarm equipment is covered under Gas and Vapor Detectors and Sensors (FTAM).

Control equipment intended to supply automatic illumination, power, or both, to critical areas and equipment essential to safety of human life is covered under Emergency Lighting and Power Equipment (FTBR).

Freestanding motor control center sections, motor control center units and equipment intended for field installation into a motor control center are covered under Motor Control Centers (NJAV).

Control panels intended for installation in hazardous (classified) locations are covered under Control Panels and Assemblies for Use in Hazardous Locations (NNNY).

Control panels provided with intrinsically safe circuits for extension into hazardous (classified) locations are covered under Industrial Control Panels Relating to Hazardous Locations (NRBX).

Cabinets, enclosures and rack/frame systems that include components and assemblies intended to power, protect, heat, cool or otherwise support information technology (IT), telecommunications equipment, or audio/video equipment (A/V) are covered under Information Technology and Communications Equipment Cabinet, Enclosure and Rack Systems (NWIN).

Equipment intended for the control of fuel cells, photovoltaic systems, or utility interactive systems are covered under AC Modules (QHYZ), Distributed Resource Power Systems (QJIL) or Static Inverters and Converters for Use in Independent Power Systems (QIKH).

Portable control panels containing switches, overcurrent protection, and that are cord connected via attachment plugs and receptacles for use at carnivals, circuses, fairs, exhibition halls, motion picture and television studios, theaters, construction sites and similar locations are covered under Portable Power Distribution Units and Devices (QPSH) or Portable Power Distribution Panels (QPSM).

Assemblies comprised of equipment such as circuit breakers, fuses, switches, and related accessory equipment and intended to distribute power to field installed communications equipment are covered under Power Distribution Centers for Communications Equipment (QPQY).

Control panels intended for industrial application on power-operated machines intended for such uses as pressing, punching, shearing or braking operations, and additionally investigated in accordance with the Occupational Safety and Health Administration Standard Section 1910.217 are covered under Press and Other Power-operated Machine Controls and Systems (QUEQ).

Controllers intended for electric fire pumps are covered under Pump Controllers, Fire (QYZS).

Industrial control panels additionally investigated in accordance with SEMI S2 Standards are covered under Control Panels (TWRP).

Control panels containing electrical control units for use in fire-protective signaling systems are covered under Control Units, Releasing Device (SYZV), Control Units, System (UOJZ) or Smoke Control System Equipment (UUKL).

Control panels intended for use with equipment for water-play fountains and water playground areas, swimming pools and spas, or fountains with water in common with swimming pools are covered under Controls (WAWU).

Freestanding assemblies of circuit breakers and busses for control of electric light and power circuits of equipment for installation into dead-front switchboards are covered under Switchboards, Dead-front (WEVZ).

Enclosed assemblies consisting only of lengths of busbars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors for power circuits are covered under Termination Boxes (XCKT).

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 508A, "Industrial Control Panels."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Open Industrial Control Panel," "Enclosed Industrial Control Panel" or "Industrial Control Panel Enclosure."

The "Enclosed Industrial Control Panel" Listing Mark covers both the enclosure and the provided panel. Open panels employ the "Open Indus-

Industrial Control Panels (NITW)—Continued

trial Control Panel" Listing Mark. The "Industrial Control Panel Enclosure" Listing Mark covers only the enclosure; the compatibility of the enclosure and the installed equipment and associated wiring has not been investigated unless an "Enclosed Industrial Control Panel" Listing Mark is also present.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTOR CONTROL CENTERS (NJAV)**GENERAL**

This category covers motor control centers, which are floor-mounted assemblies of one or more enclosed vertical sections having a common horizontal power bus and primarily containing combination motor control units. In addition, motor control centers may contain other types of units, such as relay units, circuit breaker units, disconnect switch units, or panelboard units. Units are mounted one above the other in the vertical sections. Power may be supplied to the individual units by vertical power bus or, if the bus is omitted, by suitable wiring to the horizontal bus.

A combination motor control unit includes an externally operable circuit disconnecting means, branch circuit overcurrent protection, and a motor controller. Motor control centers are intended for installation in accordance with Article 430 of ANSI/NFPA 70, "National Electrical Code."

Motor control center sections and units are rated 600 V maximum.

Motor control center sections are rated for the maximum current for horizontal and vertical bus. A motor control center section is marked "Short-circuit current rating amps – RMS symmetrical volts – maximum. Do not install on circuits with available short-circuit currents greater than the lowest short-circuit rating of any installed unit," or the equivalent.

Combination motor control center units are rated in horsepower. A motor control center unit is marked "Unit short-circuit current rating – RMS symmetrical amps – volts maximum, when equipped with fuse or circuit breaker," or the equivalent.

A motor control center section or enclosure investigated for outdoor use is marked "Rainproof." A motor control center enclosure is intended to enclose one or more motor control center sections.

USE AS SERVICE EQUIPMENT

The marking "Suitable For Use As Service Equipment" appears on each motor control center section optionally intended for use at a service.

Some motor control center sections incorporate neutrals factory bonded to the enclosure. Such sections are marked "Suitable Only For Use As Service Equipment."

A section marked for use at services may also be used to provide the main control and disconnecting means for a separately derived system.

RELATED PRODUCTS

For information concerning overcurrent protective devices for motor controllers, see Motor Controllers (NJOT).

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 845, "Motor Control Centers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Motor Control Center Unit," "Motor Control Center Section" or "Motor Control Center Rainproof Enclosure."

The Listing Mark for motor control center sections also includes the marking "___ of ___." The first space is stamped with a number indicating the position that the section occupies in the series of sections constituting the motor control center. The latter space is stamped with the total number of sections in the motor control center. The Listing Mark on the motor control center section does not cover the individual units that are installed in the section.

The splice bus for interconnecting horizontal bus of abutting vertical sections in the series is also covered by the section Listing Mark.

Each Listed motor control center unit is identified by its own Listing Mark. Only those sections and units that bear the Listing Mark are covered under UL's Follow-Up Service.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

Motor Control Centers (NJAV)—Continued

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Motor Control Center Accessories (NJAX)**USE**

This category covers accessories, such as protective devices, wiring terminals, handle extensions and other optional equipment, intended for field installation for use only with specific motor control centers and/or motor control center units. Correct combinations of motor control centers and motor control center accessories are indicated by markings on the accessory and may also be marked on the motor control center. Correct combinations of motor control center units and motor control center unit accessories are indicated by markings on both the motor control center units and the accessory.

ADDITIONAL INFORMATION

For additional information, see Motor Control Centers (NJAV), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 845, "Motor Control Centers."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Motor Control Center Accessory" or "Motor Control Center Unit Accessory."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Retrofit Motor Control Center Units Classified for Use in Specified Equipment (NJBR)**GENERAL**

This category covers retrofit motor control center units intended for field installation in specified motor control center sections. These products have been investigated to determine, when used in accordance with the manufacturer's instructions, they do not adversely affect the operation of the specified motor control center section or other units within the section. The ratings on the unit apply unless the ratings on the motor control center section are lower. In either case the lower rating is applicable.

These retrofit motor control center units include an externally operable circuit-disconnecting means, branch-circuit overcurrent protection, and a motor controller intended for installation in accordance with Article 430 of ANSI/NFPA 70, "National Electrical Code."

This category does not cover the servicing or rebuilding of previously installed certified motor control center units.

PRODUCT MARKINGS

In addition to other required markings, the nameplate on the retrofit motor control center unit is marked to indicate the specified motor control center section(s) for which it is intended, including the motor control center section manufacturer and type or model number.

RELATED PRODUCTS

See Motor Control Center Accessories (NJAX).

ADDITIONAL INFORMATION

For additional information, see Motor Control Centers (NJAV), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 845, "Motor Control Centers," in addition to the requirements contained in UL Subject 2727, "Outline of Investigation for Retrofit Motor Control Center Units for Use with Specified Motor Control Center Sections."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

Retrofit Motor Control Center Units Classified for Use in Specified Equipment (NJBR)—Continued**RETROFIT MOTOR CONTROL CENTER UNIT FOR USE ONLY IN MOTOR CONTROL CENTER SECTION(S) AS DESIGNATED ON THE NAMEPLATE****Issue No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTOR CONTROLLERS OVER 1500 VOLTS (NJHU)**GENERAL**

This category covers enclosed motor controllers having ac voltage ratings of 1501 V to 15 kV, intended for starting, stopping, regulating, controlling, or protecting electric motors or other electrical loads, including refrigeration equipment.

This equipment has been investigated for use on three-phase circuits having available fault levels not exceeding the MVA or kA rating appearing on the nameplate. The three-phase available symmetrical MVA is equal to the product of the available symmetrical rms short-circuit current, the line-to-line open circuit voltage, and a phase factor of 1.73×10^6 .

Motor controllers are intended for across-the-line starting and for making and breaking the circuit when the motor is stalled; accordingly, they are tested at six times the continuous current rating of the controller at rated voltage.

Some motor controllers are provided with an integrally mounted surge arrester to meet the required impulse withstand.

These motor controllers are substantially complete when shipped from the factory and final acceptability for service does not depend upon assembly of parts in the field.

These motor controllers may consist of a single vertical section housing one or more individual controllers, or may consist of several abutting vertical sections intended for interconnection by means of a suitable horizontal bus. These vertical sections are normally freestanding; however, a single motor controller may be provided in a construction intended for wall mounting.

This category covers both electromechanical and solid-state-type controllers. Solid-state controllers have static switching elements for stopping, starting, and controlling the load, and are also provided with an isolating means which, when opened, provides a visible isolation gap.

ARC-RESISTANT MOTOR CONTROLLERS

Motor controllers specially designed to provide some degree of protection to an operator, or other personnel in the vicinity of the equipment, from the effects of an internal arc occurring in atmospheric air within the enclosure when the doors and covers are secured as intended may additionally be Classified as arc-resistant motor controllers.

Arc-resistant motor controllers have been investigated for installation in buildings (for indoor applications) that have sufficient overhead space to permit venting without reflecting arc products, as specified in the installation instructions.

Arc-resistant motor controllers are marked with an Accessibility Type designation of Type 1, 1C, 2 or 2C, based upon the construction.

Type 1 designates motor controllers with arc-resistant construction at the front only.

Type 1C designates motor controllers with arc-resistant construction at the front, and between compartments within the same section or adjacent sections.

Type 2 designates motor controllers with arc-resistant construction at the front, sides and rear.

Type 2C designates motor controllers with arc-resistant construction at the front, sides and rear, and between compartments within the same section or adjacent sections.

In Type 1C or 2C equipment, a fault in a main busbar compartment may propagate into the main busbar compartments of adjacent sections.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate electromechanical products rated 7200 V or less in this category is ANSI/UL 347, "High Voltage Industrial Control Equipment." The basic requirements used to investigate controllers rated 7201 V to 15 kV, and solid-state-type controllers rated 1501 V to 15 kV in this category are contained in UL Subject 347B, "Outline of Investigation for Medium Voltage Motor Controllers, Up to 15 kV."

Motor Controllers Over 1500 Volts (NJHU)—Continued

In addition to the basic standards noted above, the standard used to investigate motor controllers Classified as “arc resistant” is IEEE C37.20.7, “IEEE Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal Arcing Faults.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “High Voltage Industrial Control Equipment” or “High Voltage Motor Control Equipment Section.”

The Listing Mark for high-voltage motor control equipment sections also includes the designation “___ of ___.” The first blank is stamped with the number indicating the position that the section occupies in the series of sections constituting the high-voltage motor control equipment. The second blank is stamped with the total number of sections in the high-voltage motor control equipment (including sections not bearing a UL Listing Mark).

Each Listed high-voltage motor control equipment section consists of one or more high-voltage industrial control equipment units. Each Listed high-voltage industrial control equipment unit is individually identified as a Listed product.

Classification Mark for Arc-resistant Motor Controllers

The Classification Mark of UL on motor controllers investigated as arc resistant is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark consists of the appropriate Listing Mark (noted above) and the following additional information:

ARC-RESISTANT MOTOR CONTROLLER**ALSO CLASSIFIED IN ACCORDANCE WITH IEEE C37.20.7**

The Classification Mark appears on the front of each vertical section eligible for Classification. The Classification Mark covers only the vertical section to which it is affixed; it does not cover other vertical sections included in the assembly, or removable units. Each vertical section of a line-up of abutting vertical sections is provided with a “___ of ___” marking, where the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark, and the second blank indicates the total number of vertical sections (including sections not bearing the UL Mark).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Power Conversion Equipment, Medium Voltage (NJIC)**GENERAL**

This category covers enclosed power conversion equipment with primary voltage ratings of 1501 to 15 kV, intended for use in accordance with ANSI/NFPA 70, “National Electrical Code.” This equipment supplies power to control a motor or motors operating at a frequency or voltage different than the input supply voltage. This category also covers power-supply modules, input and output modules, SCR or transistor output modules, dynamic braking modules, and input/output accessory kits for medium-voltage power conversion equipment.

PRODUCT MARKINGS

Medium-voltage power conversion equipment incorporating overload protection for motors is marked to indicate the level of protection provided in percent of full-load current. Where such protection is adjustable, a marking with instructions for adjustment is provided.

Equipment not providing motor overload protection is marked to indicate motor protection, such as thermal overload relays, or a thermally protected motor must be otherwise provided.

Medium-voltage power conversion equipment is marked with the following electrical ratings:

- **Input Ratings:** Voltage, maximum continuous input current, frequency, number of phases, maximum allowable system symmetrical short-circuit current, and impulse withstand.
- **Output Ratings:** Maximum output voltage, rated continuous current, frequency range and number of phases.

ADDITIONAL INFORMATION

For additional information, see Motor Controllers Over 1500 Volts (NJHU), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 347A, “Outline of Investigation for Medium Voltage Power Conversion Controllers.”

Power Conversion Equipment, Medium Voltage (NJIC)—Continued**UL MARK**

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Medium Voltage Power Conversion Equipment.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTOR CONTROLLER ACCESSORIES OVER 1500 VOLTS (NJIJ)**USE**

This category covers accessories intended for field installation in motor controllers having ac voltage ratings in the range of 1501 V to 15 kV. The motor controllers are intended for starting, stopping, regulating, controlling, or protecting electric motors or other electrical loads, including refrigeration equipment.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products rated 7200 V or less in this category is ANSI/UL 347, “High Voltage Industrial Control Equipment.”

The basic requirements used to investigate products in this category rated 7201 V to 15 kV are contained in UL Subject 347B, “Outline of Investigation for Medium Voltage Motor Controllers, Up to 15 kV.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “High Voltage Industrial Control Equipment Accessory.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTOR CONTROLLERS (NJOT)

This category covers the following devices rated 600 V or less, and those rated 601–1500 V:

- Auxiliary devices
- Combination motor controllers
- Float- and pressure-operated motor controllers
- Magnetic motor controllers
- Manual motor controllers
- Mechanically-operated and solid-state motor controllers
- Overload relays
- Power conversion equipment

Horsepower ratings — Unless otherwise marked, motor controllers with three-phase horsepower ratings are intended for use with induction-type squirrel cage Design B, C or D motors. Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and locked rotor current. For single-phase motors, the tested locked rotor current is at six times the motor full-load running current for ac ratings, and at ten times the motor full-load running current for dc ratings. For three-phase motors, the tested locked rotor current is as in Table 430.251(B) of ANSI/NFPA 70, “National Electrical Code” (NEC). For motor ratings in excess of 500 hp, the full-load current and locked-rotor currents are also specified. Some motor controllers are marked with the full-load current (FLA) and locked-rotor current (LRA) in lieu of horsepower when they are intended to control motors equivalent to 2 hp or smaller.

Overload relay tripping class — Overload relays or industrial control equipment incorporating overload relays are identified as to their maximum tripping time at 600% of the overload relay current-element trip rating. The designations “Class 10,” “Class 20,” and “Class 30” are used to identify the maximum tripping times, with the Class number indicating the maximum tripping time in seconds. Overload relays with maximum tripping times of

Motor Controllers (NJOT)—Continued

10 or 30 seconds are marked "Class 10" and "Class 30," respectively. Overload relays with a maximum tripping time of 20 seconds may be marked "Class 20." Overload relays with tripping times in excess of 30 seconds are marked with their maximum tripping times. All unmarked overload relays have a maximum tripping time of 20 seconds.

Overload relay instructions — Open-type overload relays with replaceable heater elements, or adjustable or electronic settings, are provided with additional instructions on an adhesive-backed label that is intended to be adhered to the ultimate enclosure for the equipment. These instructions also contain short-circuit ratings and required size and type of branch-circuit protection.

Overload relays with ground-fault current-sensing feature — Some overload relays are provided with a ground-fault current-sensing feature that has been investigated as providing additional protection to the motor circuit. This ground-fault current-sensing feature is not intended to be used for ground-fault current protection required by the NEC; see Ground-fault Sensing and Relaying Equipment (KDAX). When this feature is provided and activated/selected, the overload relay is caused to trip when a differential current occurs between phases that is in excess of the pick-up current or tripping curve specified in the manufacturer's instructions.

Branch-circuit-protection requirements — Overload relays, motor controllers and motor starters (e.g., motor controllers incorporating thermal cutouts, thermal overload relays or other devices for motor-running over-current protection) are considered to be suitably protected against overcurrent due to short circuits or grounds by motor branch-circuit, short-circuit and ground-fault protective devices selected in accordance with the NEC and any additional information marked on the product. Motor controllers may specify that protection is to be provided by fuses only or, additionally, by an inverse-time circuit breaker. If there is no marking regarding the protective device type, controllers are considered suitably protected by either type of device. Motor controllers may specify a maximum rating of protective device. If not marked with a rating, the controllers are considered suitably protected by a protective device of the maximum rating permitted by the NEC.

Short-circuit-current rating — Combination motor controllers, overload relays, motor controllers rated more than 1 hp at 300 V or more, motor controllers rated more than 2 hp at any voltage, and motor starters (e.g., motor controllers incorporating thermal cutouts or overload relays) have been investigated as tabulated below. These controllers are marked "Suitable for use on a circuit capable of delivering not more than ___ rms symmetrical amps, ___ volts maximum," or the equivalent. These markings are provided on the motor controller or, for open-type motor controllers, the markings may be located on a separate adhesive-backed label (such as a heater table) packaged with the motor controller.

Motor Controllers Rated 600 V or Less, Max Hp Rating	Motor Controllers Rated 601–1500 V Max Full Load Current, Amps	Min Short-circuit-current Ratings, RMS Symmetrical Amps
1 or less	—	1,000
Over 1 to 50	50 or less	5,000
Over 1 to 200	Over 50 to 200	10,000
Over 200 to 400	Over 200 to 400	18,000
Over 400 to 600	Over 400 to 600	30,000
Over 600 to 900	Over 600 to 850	42,000
Over 900 to 1600	Over 850 to 1500	85,000
Over 1600	Over 1500	100,000

Motor controllers that have additionally been investigated for use at higher available fault currents than the minimum short-circuit-current ratings tabulated are marked "Suitable for use on a circuit capable of delivering not more than ___ rms symmetrical amps, ___ volts maximum when protected by Class ___ fuses or when protected by a circuit breaker having an interrupting rating not less than ___ rms symmetrical amperes, ___ volts maximum," as applicable.

Motor controllers intended for group installations are marked "Suitable for motor group installation on a circuit capable of delivering not more than ___ rms symmetrical amperes, ___ volts maximum."

Manual motor controllers additionally investigated for use as tap conductor protection in accordance with Section 430.53 (D)(3) of the NEC are marked "Suitable for tap conductor protection in group installations."

Controllers intended for electric-motor-driven fire pumps are covered under Pump Controllers, Fire (QYZS).

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Adjustable-speed Power Drive Systems with Integral Supply Engine Generators (NKBA)

GENERAL

This category covers adjustable-speed power drive systems that are supplied by stationary electrical generating equipment driven by gasoline, LP-gas, natural gas or diesel-fueled internal-combustion engines. The adjustable-speed drive system supplies power to and controls a motor or motors operating at a frequency or voltage different than the input supply voltage.

Supply connections between the stationary electrical generating equipment and the adjustable-speed power drive systems are factory installed. Adjustable-speed power drive systems with integral supply engine generators are of the enclosed type.

This equipment is rated 600 V or less and intended for use in unclassified locations in accordance with Articles 430 of ANSI/NFPA 70, "National Electrical Code," and ANSI/NFPA 37, "Installation and Use of Stationary Combustion Engines and Gas Turbines."

This category does not cover adjustable-speed power drive systems with integral supply engine generators intended for use in safety-related functions (i.e., functional safety applications), mounted on trailers, or intended for temporary installation.

PRODUCT MARKINGS

Adjustable-speed power drive systems with integral supply engine generators incorporating overload protection for motors and not intended for use with remote or external motor overload protection are marked to indicate the level of protection provided in percent of full-load current. Where such protection is adjustable, a marking with instructions for adjustment is provided. Equipment not providing motor overload protection is marked to indicate motor protection such as thermal overload relays, or a thermally protected motor must be otherwise provided.

Adjustable-speed power drive systems with integral supply engine generators are marked with output motor electrical ratings.

RELATED PRODUCTS

Stationary electrical generating equipment driven by gasoline, LP-gas, natural gas or diesel-fueled internal-combustion engines without integral supply connections to adjustable-speed power drive systems is covered under Engine Generators (FTSR).

Adjustable-speed power drive systems without integral supply connections to stationary electrical generating equipment are covered under Power Conversion Equipment (NMMS).

ADDITIONAL INFORMATION

For additional information, see Motor Controllers (NJOT), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2200, "Stationary Engine Generator Assemblies," in addition to ANSI/UL 508C, "Power Conversion Equipment," or ANSI/UL 61800-5-1, "Adjustable Speed Electrical Power Drive Systems - Part 5-1: Safety Requirements - Electrical, Thermal and Energy."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Adjustable-speed Power Drive System with Integral Supply Engine Generator."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Auxiliary Devices (NKCR)

GENERAL

This category covers:

- Magnetically operated control switches (relays)
- Manually operated switches (push buttons, key-operated switches)
- Biometrically operated switches (fingerprint/optically operated switches)
- Pilot lights
- Push-button stations (including parts such as pilot lights and selector switches)
- Electronic, thermal and magnetic overload relays
- Time-delay relays
- Foot-operated switches
- Flow switches
- Liquid-level controls
- Printed wiring board assemblies incorporating switched outputs

PRODUCT CATEGORIES BY CATEGORY CODE

Auxiliary Devices (NKCR)—Continued

Some pilot lights and push-button assemblies are of a modular construction where individual parts, such as lenses, lampholders, operators and contact blocks, are individually certified and identified for use with mating parts.

These devices are intended for use in control circuits of magnetic motor controllers and the like. The contacts and switched outputs are marked with the voltage rating and whether they are intended for Standard Duty or Heavy Duty, or with a code designation such as A600, B600, etc. These codes represent the control circuit load that may be controlled by the device. The significance of each code is shown in the tables below. Standard Duty indicates ratings under Codes B and P; Heavy Duty indicates ratings under Codes A and N for the marked voltage rating.

Rating Codes for AC Control-circuit Contacts at 50 and 60 Hz

Contact Rating Code Dsg ^a	Thermal Continuous Test Current Amps	Max Current Amps ^b										
		120 V		240 V		480 V		600 V		Max Volt-amps		
		Make	Break	Make	Break	Make	Break	Make	Break	Make	Break	
A150	10	60	6.00	—	—	—	—	—	—	—	7200	720
A300	10	60	6.00	30	3.00	—	—	—	—	—	7200	720
A600	10	60	6.00	30	3.00	15	1.50	12	1.20	—	7200	720
B150	5	30	3.00	—	—	—	—	—	—	—	3600	360
B300	5	30	3.00	15	1.50	—	—	—	—	—	3600	360
B600	5	30	3.00	15	1.50	7.5	0.75	6	0.60	—	3600	360
C150	2.5	15	1.5	—	—	—	—	—	—	—	1800	180
C300	2.5	15	1.5	7.5	0.75	—	—	—	—	—	1800	180
C600	2.5	15	1.5	7.5	0.75	3.75	0.375	3.00	0.30	—	1800	180
D150	1.0	3.60	0.60	—	—	—	—	—	—	—	432	72
D300	1.0	3.60	0.60	1.80	0.30	—	—	—	—	—	432	72
E150	0.5	1.80	0.30	—	—	—	—	—	—	—	216	36

^aThe numerical suffix designates the maximum voltage design values, which are to be 600 V, 300 V and 150 V for suffixes 600, 300 and 150, respectively.

^bFor maximum ratings at voltages between the maximum design value and 120 V, the maximum make and break ratings are to be obtained by dividing the volt-ampere rating by the application voltage. For voltages below 120 V, the maximum make current is to be the same as for 120 V, and the maximum break current is to be obtained by dividing the break volt-amperes by the application voltage, but are not to exceed thermal continuous test current.

These devices have not been investigated for providing restricted-access control to machinery or specifically defined areas. Such equipment is investigated to ANSI/UL 294, "Access Control System Units."

These devices have not been investigated with respect to functional-safety applications or as emergency stop switches; see Emergency Stop Devices (NISD).

Rating Codes for DC Control-circuit Contacts

Contact Rating Code Dsg ^a	Thermal Continuous Test Current Amps	Max Make or Break ^b Current Amps			Max Make or Break V Amps at 300 V or Less
		125 V	250 V	301 to 600 V	
		N150	10	2.2		—	—	275
N300	10	2.2	1.1	—	275
N600	10	2.2	1.1	0.40	275
P150	5.0	1.1	—	—	138
P300	5.0	1.1	0.55	—	138
P600	5.0	1.1	0.55	0.20	138
Q150	2.5	0.55	—	—	69
Q300	2.5	0.55	0.27	—	69
Q600	2.5	0.55	0.27	0.10	69
R150	1.0	0.22	—	—	28
R300	1.0	0.22	0.11	—	28

^aThe numerical suffix designates the maximum voltage design values, which are to be 600 V, 300 V and 150 V for suffixes 600, 300 and 150, respectively.

^bFor maximum ratings at 300 V or less, the maximum make and break ratings are to be obtained by dividing the volt-ampere rating by the application voltage, but are not to exceed the thermal continuous test current.

ADDITIONAL INFORMATION

For additional information, see Motor Controllers (NJOT), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

Electronic, thermal and magnetic overload relays are investigated to ANSI/UL 508, or ANSI/UL 60947-1, "Low-Voltage Switchgear and Controlgear - Part 1: General Rules," and ANSI/UL 60947-4-1A, "Low-Voltage

Auxiliary Devices (NKCR)—Continued

Switchgear and Controlgear - Part 4-1A: Contactors and Motor-Starters - Electromechanical Contactors and Motor-Starters."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq.") or "Auxiliary Device" (or "Aux. Dev.>").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Combination Motor Controllers (NKJH)

USE AND INSTALLATION

This category covers combination motor controllers, which provide the motor branch-circuit functions of motor controller, disconnect means, short-circuit and ground-fault protection and motor overload protection. The functions may be provided by individual discrete components or be combined in a single controller unit.

These products are marked "Combination Motor Controller" to signify that all of the motor branch-circuit functions indicated above have been investigated and are included in the certification of the controller.

An open-type combination motor controller is intended for factory installation in a switchboard, motor control center, industrial control panel or the like, or for field installation in an enclosure for industrial control equipment, a cabinet or a cutout box.

Combination motor controllers are marked with a short-circuit rating and are intended for connection to circuits in which the available fault current does not exceed the marked short-circuit rating.

ADDITIONAL INFORMATION

For additional information, see Motor Controllers (NJOT), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment," or ANSI/UL 60947-1, "Low-Voltage Switchgear and Controlgear - Part 1: General Rules," and ANSI/UL 60947-4-1A, "Low-Voltage Switchgear and Controlgear - Part 4-1A: Contactors and Motor-Starters - Electromechanical Contactors and Motor-Starters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Combination Motor Controller" (or "Comb. Mtr. Cntrl.>").

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Motor Controllers, Float- and Pressure-operated (NKPZ)

USE

This category covers:

Float-operated switches, including weight-operated switches

Pressure-operated switches, including vacuum-operated switches

These devices are intended for direct control of motors and/or control of general-use-type loads.

Unless otherwise marked, these devices are intended for use only with air, water, or other nonhazardous fluids.

RELATED PRODUCTS

Pressure-operated switches investigated for use in connection with automatic sprinkler or similar protective equipment are covered under Switches, Pressure (VOXZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

Motor Controllers, Float- and Pressure-operated (NKPZ)—Continued

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq.>").

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Motor Controllers, Magnetic (NLDX)

GENERAL

This category covers:

- Across-the-line starters
- Across-the-line starters with motor circuit switches
- Combined starters and speed regulators
- Reduced-voltage starters, such as autotransformer, part-winding wye-delta, reactance and resistant types
- Speed regulators

Magnetic motor controllers have been tested to determine their acceptability for continuous operation at their marked rated load.

RELATED PRODUCTS

Magnetic switches for controlling other than motor loads are covered under Switches, Industrial Control (NRNT).

ADDITIONAL INFORMATION

For additional information, see Motor Controllers (NJOT), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment," or ANSI/UL 60947-1, "Low-Voltage Switchgear and Controlgear - Part 1: General Rules," and ANSI/UL 60947-4-1A, "Low-Voltage Switchgear and Controlgear - Part 4-1A: Contactors and Motor-Starters - Electromechanical Contactors and Motor-Starters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq.") or "Magnetic Motor Controller" (or "Mag. Mtr. Cntrlr.>").

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Motor Controllers, Manual (NLRV)

GENERAL

This category covers the following manually-operated devices intended for across-the-line starting of motors:

- Across-the-line starters
- Autotransformer starters
- Combined starters and speed regulators
- Reactance-type starters
- Resistance-type starters
- Speed regulators

Motor disconnect switch — Manual motor controllers that have been additionally investigated for use as a motor disconnect switch are marked "Suitable as Motor Disconnect." These devices are intended to be installed on the load side of motor branch-circuit protection in accordance with Section 430.109(A)(6) of ANSI/NFPA 70, "National Electrical Code" (NEC).

Tap conductor protection — Manual motor controllers that have been additionally investigated for use as tap conductor protection within a motor group are marked "Suitable as Tap Conductor Protection in Group Installations." These devices are intended to be installed on the load side of motor branch-circuit protection for a motor group in accordance with Section 430.53(D)(3) of the NEC.

ADDITIONAL INFORMATION

Motor Controllers, Manual (NLRV)—Continued

For additional information, see Motor Controllers (NJOT), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment," or ANSI/UL 60947-1, "Low-Voltage Switchgear and Controlgear - Part 1: General Rules," and ANSI/UL 60947-4-1A, "Low-Voltage Switchgear and Controlgear - Part 4-1A: Contactors and Motor-Starters - Electromechanical Contactors and Motor-Starters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Manual Motor Controller" (or "Man. Mtr. Cntrlr.>").

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Motor Controllers, Mechanically Operated and Solid-state (NMFT)

GENERAL

This category covers the following devices intended for across-the-line starting of motors:

- Flow-operated motor controllers
- Machine-operated motor controllers
- Soft starters
- Solid-state starters
- Solid-state reduced-voltage starters
- Solid-state speed controls

These devices are intended for the direct control of motors.

Mechanically operated and solid-state motor controllers have been tested to determine their acceptability for continuous operation at their marked rated motor load.

REBUILT PRODUCTS

This category also covers mechanically operated and solid-state motor controllers that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt mechanically operated and solid-state motor controllers are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt mechanically operated and solid-state motor controllers are subject to the same requirements as new mechanically operated and solid-state motor controllers.

RELATED PRODUCTS

Devices intended for use in control circuits of magnetic motor controllers and the like are covered under Auxiliary Devices (NKCR).

Devices intended for use in nonmotor circuits other than motor control circuits are covered under Switches, Industrial Control (NRNT).

ADDITIONAL INFORMATION

For additional information, see Motor Controllers (NJOT), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq."), "Solid-state Motor Controller" or "Solid-state Reduced-voltage Starter."

For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

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Power Conversion Equipment (NMMS)**GENERAL**

This category covers equipment that supplies power to and controls a motor or motors operating at a frequency or voltage different than the input supply voltage. This category also covers power-supply modules, input and output modules, SCR or transistor output modules, dynamic braking modules, and input/output accessory kits for power conversion equipment. Power conversion equipment may be of the open or enclosed type. This equipment is intended for use in ordinary locations in accordance with Articles 430 and 440 of ANSI/NFPA 70, "National Electrical Code."

Power conversion equipment incorporating overload protection for motors and not intended for use with remote or external motor overload protection is marked to indicate the level of protection provided in percent of full load current. Where such protection is adjustable, a marking with instructions for adjustment is provided. Equipment not providing motor overload protection is marked to indicate motor protection such as thermal overload relays, or a thermally protected motor must be otherwise provided.

Power conversion equipment is marked with input electrical ratings and output motor electrical ratings.

This category does not cover power conversion equipment intended for use in safety-related functions (i.e., functional safety applications).

REBUILT PRODUCTS

This category also covers power conversion equipment that is rebuilt by the original manufacturer or by the Applicant's authorized manufacturer as found in the original product Follow-Up Service Procedure Authorization Page or Addendum to the Follow-Up Service Procedure Authorization Page. Rebuilt power conversion equipment is rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power conversion equipment is subject to the same requirements as new power conversion equipment, including production-line tests as applicable.

RELATED PRODUCTS

Power conversion equipment rated over 1500 V is covered under Power Conversion Equipment, Medium Voltage (NJC).

Equipment intended to provide a primary, secondary, or primary and secondary power source to nonspecific loads in parallel or separate from the utility is investigated in accordance with UL 1741, "Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources," and covered under Static Inverters and Converters for Use in Independent Power Systems (QIKH). Examples of this equipment are utility interactive, stand-alone, and multimode inverters and converters.

ADDITIONAL INFORMATION

For additional information, see Motor Controllers (NJOT), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508C, "Power Conversion Equipment," or ANSI/UL 61800-5-1, "Adjustable Speed Electrical Power Drive Systems - Part 5-1: Safety Requirements - Electrical, Thermal and Energy."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq.") or "Power Conversion Equipment."

For rebuilt products, the word "Rebuilt," "Refurbished" or "Remanufactured" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PHOTOVOLTAIC MANUAL-DISCONNECT SWITCHES (NMSJ)**USE**

This category covers open and enclosed manual-disconnect switches intended for use in photovoltaic (PV) systems. These devices are intended for disconnecting the output of dc PV panels.

PRODUCT MARKINGS

In addition to the product markings required in ANSI/UL 508, "Industrial Control Equipment," these devices are also marked with: "Suitable as photovoltaic disconnect switch in accordance with Article 690 of NFPA 70 (NEC)."

RELATED PRODUCTS

Controllers intended for the direct control of motors are rated in horsepower and are covered under Motor Controllers, Magnetic (NLDX).

Photovoltaic Manual-disconnect Switches (NMSJ)—Continued

Manual motor controllers and manual motor controllers suitable for disconnecting motor loads are covered under Motor Controllers, Manual (NLRV).

Mechanically operated and solid-state motor controllers are covered under Motor Controllers, Mechanically Operated and Solid-state (NMFT).

Industrial control switches intended for switching nonmotor loads are covered under Switches, Industrial Control (NRNT2).

Magnetic switches for controlling other than motor loads are covered under Switches, Industrial Control (NRNT).

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment," in addition to the requirements contained in UL Subject 508I, "Outline of Investigation for Manual Disconnect Switches for Use in Photovoltaic Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photovoltaic Manual-disconnect Switch" (or "PV Manual-disconnect Switch").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

POWER CIRCUIT AND MOTOR-MOUNTED APPARATUS (NMTR)**GENERAL**

This category covers autotransformers, including motor-starting and variable-voltage types; battery chargers for industrial use; magnetically operated brakes; magnetically operated clutches; busbars; enclosed slip rings; lamp dimmers, including incandescent, fluorescent, mercury vapor, surgical light and theater use; phase converters; power-factor-correction equipment; power supplies for industrial use; reactors, including line chokes; current transformers and current transducers; voltage transformers and voltage transducers; and resistors, including motor-starting, rheostats, potentiometers, and high-impedance grounding types.

A brake or clutch may consist of several parts with the Certification Mark appearing on the main electrical part (e.g., field coil). Where other part(s) are essential to complete a certified assembly, the basic unit is marked to indicate the parts needed.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq.>").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PROGRAMMABLE CONTROLLERS (NRAQ)**GENERAL**

This category covers programmable industrial control systems utilizing a programmable memory for internal storage of user-oriented instructions for specific functions, such as logic, sequencing, counting, and controlling various industrial equipment through digital or analog inputs or outputs. This category also covers power supplies, central processing units, input and output accessories, computer interfaces, and programming or program diagnostic units associated with programmable control systems.

All products covered under this category are marked with their electrical ratings. Output devices may have more than one rating. At least one rating

Programmable Controllers (NRAQ)—Continued

is marked on the output device and additional ratings may be marked on an instruction sheet referenced on the output device.

RECONDITIONED PRODUCTS

This category also covers programmable controllers and their accessories which have been reconditioned by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. (Reconditioned programmable controllers and their accessories may also be referred to as rebuilt.) Reconditioned programmable controllers and their accessories are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Reconditioned programmable controllers and their accessories are subject to the same requirements as new programmable controllers and their accessories.

RELATED PRODUCTS

This category does not cover primary safety controls intended for programming and monitoring the operation of the burner on gas-, gas-oil-, or oil-fired appliances. Such controls are covered under Controls, Primary Safety (MCCZ).

This category does not cover equipment intended for use in applications involving instruments for measurement, recording and/or control of process variables (such as temperature, pressure, flow, etc.) and auxiliary devices used with these instruments, such as sensors, transducers and valve operations. Such equipment is covered under Process Control Equipment, Electrical (QUYX).

This category does not cover programmable controllers intended for use in safety-related functions (i.e., functional safety applications). Such controllers are covered under Programmable Safety Controllers (NRGF).

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment," or ANSI/UL 61131-2, "Programmable Controllers – Part 2: Equipment Requirements and Tests."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq.") or "Programmable Controller" (or "Prog. Cntr.>").

For reconditioned products, the word "Reconditioned" or "Rebuilt" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PROGRAMMABLE CONTROLLERS, RETROFIT, CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (NRCQ)

GENERAL

This category covers certified programmable controller retrofit kits intended for use in specified equipment in general industrial-use applications. This equipment is rated 600 V or less and is intended for use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). This equipment is suitable for use in lieu of certified programmable controllers. These products have been investigated by UL to determine that, when used in accordance with the manufacturer's instructions, they do not adversely affect the operation of the complete unit.

These programmable controller retrofit kits require field assembly of modules or subassemblies, which are appropriately marked as indicated below.

Programmable controller retrofit kits are intended to be used to replace programmable controllers installed in the field using conversion modules, mounting hardware and associated wiring harnesses that permit the existing programmable controller wiring connectors to be used, allowing the remainder of the existing programmable controller to be replaced. The specific replacement programmable controller conversion modules, wiring harnesses, I/O modules, power-supply modules, etc., are identified as to which specific installed modules they are intended to replace.

A programmable controller utilizes a programmable memory for internal storage of user-oriented instructions for specific functions, such as logic, sequencing, counting, and control of various industrial equipment through digital or analog inputs or outputs. This category also covers power sup-

Programmable Controllers, Retrofit, Classified for Use in Specified Equipment (NRCQ)—Continued

plies, central processing units, input and output accessories, interfaces, and programming or program diagnostic units associated with programmable control systems.

This category does not cover the retrofit of functional safety programmable controllers.

PRODUCT MARKINGS

Programmable controller retrofit kits are marked "Classified for use only with Model ____ [product identifier as indicated in the individual certifications]."

RELATED PRODUCTS

Programmable controllers are covered under Programmable Controllers (NRAQ).

Programmable controllers intended for use in functional safety applications are covered under Programmable Safety Controllers (NRGF).

Primary safety controls intended for programming and monitoring the operation of the burner on gas, gas-oil, or oil-fired appliances are covered under Controls, Primary Safety (MCCZ).

Equipment intended for use in applications involving instruments for measurement, recording and/or control of process variables (such as temperature, pressure, flow, etc.) and auxiliary devices used with these instruments, such as sensors, transducers and valve operations are covered under Process Control Equipment, Electrical (QUYX).

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

PROGRAMMABLE CONTROLLER, RETROFIT FOR USE ONLY WITH + IDENTIFIED IN MANUFACTURER'S INSTRUCTIONS
Control No.

+ **CONVERSION MODULE NO. XXX** or **WIRING CABLE MODULE NO. XXX**, or other appropriate product name as shown in the individual Classifications

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PROGRAMMABLE SAFETY CONTROLLERS (NRGF)

USE AND INSTALLATION

This category covers control equipment incorporating software for use in safety-related functions. These devices are primarily intended to detect unsafe conditions, to alert operators, and/or take action based on out-of-specification parameters to place the equipment-under-control or system into a safe configuration. These devices may additionally have facilities for performing functions such as logic, sequencing, counting, and controlling various industrial equipment through digital or analog inputs or outputs, including dedicated safety bus architecture.

This category also covers power supplies, central processing units, input and output accessories, computer interfaces and programming or program diagnostic units associated with programmable control systems.

This category does not cover wireless communication and nondedicated communication architecture.

These products fulfill their safety-related function only when used in accordance with the manufacturer's instructions. The equipment covered under this category has been found suitable for the implementation of safety-related control functions with a safety integrity level as stated in the manufacturer's documentation and as defined in IEC 61508-1, "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 1: General Requirements," IEC 61508-2, "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 2: Requirements for Electrical/Electronic/Programmable Electronic Safety-Related Systems," and IEC 61508-3, "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 3: Software Requirements."

RATINGS

PRODUCT CATEGORIES BY CATEGORY CODE

Programmable Safety Controllers (NRGF)—Continued

All products covered under this category are marked with their electrical ratings. Output devices may have more than one rating. At least one rating is marked on the output device and additional ratings may be marked on an instruction sheet referenced on the output device.

RELATED PRODUCTS

This category does not cover programmable devices whose primary function is the control of industrial equipment. For those controls, see Programmable Controllers (NRAQ).

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are:

- ANSI/UL 508, "Industrial Control Equipment"
- ANSI/UL 1998, "Software in Programmable Components"
- ANSI/NFPA 79 (2002), "Electrical Standard for Industrial Machinery"
- IEC 61508-1, "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 1: General Requirements"
- IEC 61508-2, "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 2: Requirements for Electrical/Electronic/Programmable Electronic Safety-Related Systems"
- IEC 61508-3, "Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems – Part 3: Software Requirements"

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Programmable Safety Controller" or "Safety Related Control Device" (or "SRCDC").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PROTECTIVE RELAYS (NRGU)**GENERAL**

This category covers relays of types directly associated with power switchgear. Typical devices covered under this category are instantaneous-current relays, voltage-unbalance relays, high-speed differential relays, dc timing relays, time-overcurrent relays, reverse-power relays, and the like.

These devices are intended to make or transfer current only, and to operate only under abnormal conditions.

This category does not cover overload relays of types designed primarily for industrial control or types used with communication, traffic signaling, computer switching, or other equipment not intended for the direct control of power equipment. The ability of these relays to detect an internal arc or to provide additional protection for equipment or operating personnel has not been investigated. It has not been determined that these relays provide compliance with ANSI/NFPA 70E, "Electrical Safety in the Workplace."

Instrument transformers are not evaluated as part of the investigation, unless the manufacturer provides the instrument transformer as part of the protective relay.

These devices are intended for use in circuits rated 600 V maximum. They may be used to monitor circuits of higher voltage, when suitably rated instrument transformers are used in conjunction with these devices, such that the voltage input to the protective relay is 600 V or less.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic standard used to investigate products in this category that include ground-fault protection for equipment is ANSI/UL 1053, "Ground-Fault Sensing and Relaying Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq.>").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

Protective Relays (NRGU)—Continued

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PROXIMITY SWITCHES (NRKH)**USE**

This category covers electronic switching devices that are actuated by position of an object without mechanical contact with the object. These proximity switches respond to inductive, capacitive, LED or photoelectric effects.

These devices are intended for use on industrial machinery or mass production industrial equipment as defined by ANSI/NFPA 79, "Electrical Standard for Industrial Machinery."

PRODUCT MARKINGS

The devices are marked with electrical ratings. At least one rating is marked on the product and additional ratings may be marked on an instruction sheet shipped with the device.

RELATED PRODUCTS

This category does not cover equipment intended for use in safety-related functions, such as electro-sensitive protective equipment (ESPE) for the safeguarding of machinery that presents a risk of personal injury (e.g., light curtains). Such equipment is covered under Electro-sensitive Protective Equipment (NIOZ).

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment," or ANSI/UL 60947-1, "Low-Voltage Switchgear and Controlgear – Part 1: General Rules," and ANSI/UL 60947-5-2, "Low-Voltage Switchgear and Controlgear – Part 5-2: Control Circuit Devices and Switching Elements – Proximity Switches."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Con. Eq.") or "Proximity Switch."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SWITCHES, INDUSTRIAL CONTROL (NRNT)**GENERAL**

This category covers:

- Magnetically operated switches
- Manually operated switches
- Photoelectric switches
- Solid-state switches

These devices are intended for the direct control of nonmotor-rated loads. Open-type switches are certified for use as parts of equipment where the acceptability of the combination has been determined by UL or where open-type switches may be employed.

Switches have been tested to determine their acceptability for continuous operation at their marked rated load.

RELATED PRODUCTS

Switches intended for the direct control of motors are rated in horsepower and are covered under Motor Controllers, Magnetic (NLDX), Motor Controllers, Manual (NLRV) and Motor Controllers, Mechanically-operated and Solid-state (NMFT).

Switches intended for use in motor-control circuits are rated in pilot-duty code or volt-amperes and are covered under Auxiliary Devices (NKCR).

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment," or ANSI/UL 60947-1, "Low-Voltage Switchgear and Controlgear – Part 1: General Rules," and ANSI/UL 60947-4-1A, "Low-Voltage Switchgear and Controlgear – Part 4-1A: Contactors and Motor-Starters – Electromechanical Contactors and Motor-Starters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Ser-

INDUSTRIAL CONTROL EQUIPMENT (NIMX)

Switches, Industrial Control (NRNT)—*Continued*

vice. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment" (or "Ind. Cont. Eq.") or "Industrial Control Switch" (or "Ind. Cont. Switch").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (NNGZ)

This category covers the following devices for use in hazardous (classified) locations:

- Auxiliary devices
- Combination motor controllers
- Control assembly covers
- Control panels and assemblies
- Enclosed slip rings
- Flame-control panels
- Float- and pressure-operated motor controllers
- Magnetic motor controllers
- Manual motor controllers
- Miscellaneous motor controllers
- Motor controllers over 1500 volts
- Power circuit and motor-mounted apparatus
- Power conversion equipment
- Programmable controllers

Open-type equipment — Open-type industrial control equipment is intended for installation within a suitable enclosure. Examples of installation issues to consider when determining the suitability of the equipment enclosure include the following, as applicable: 1) the involved area classification, 2) protection against any specific environmental conditions, 3) thread engagement, and 4) whether a tool is required for opening of the enclosure. Installation requirements relating to the suitability of the enclosure are specified in the instructions or markings for the open-type equipment.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CONTROL PANELS AND ASSEMBLIES FOR USE IN HAZARDOUS LOCATIONS (NNNY)

GENERAL

This category covers control panels and assemblies consisting of enclosures and electrical components such as push-button stations, pilot lights, motor controllers, and receptacles with plugs.

A single enclosure or a group of interconnected (modular) enclosures may be used for mounting the electrical components.

The enclosures making up a modular assembly are intended to be interconnected either at the factory or in the field by the user. Limitations on the interconnection of the enclosures are given on or with the product.

The electrical components are provided as part of the product and are intended to be installed either at the factory or in the field by the user.

It is intended that wiring between the electrical components of modular assemblies be field installed.

Lead wire seals are not required between the modular enclosures. However, conduit runs entering an assembly should be sealed in accordance with ANSI/NFPA 70, "National Electrical Code," unless factory-made seals are provided and the product is marked to so indicate.

Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor-running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Overload units of motor controllers are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other certified

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN HAZARDOUS
LOCATIONS (NNGZ)

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Control Panels and Assemblies for Use in Hazardous
Locations (NNNY)—*Continued*

ratings in order that proper overload units may be furnished. Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for ac horsepower ratings, and at 10 times motor full load running current for dc horsepower ratings.

Pilot lights without guards should be used only where not subject to breakage.

Receptacles with plugs included on certified assemblies have been subjected to endurance and overload operation tests in the presence of the specific flammable atmospheres for Class I locations and while heavily blanketed with combustible dust for Class II locations.

The plugs of the receptacle-plug combinations are for use with Type S, SO, ST or STO flexible cord with grounding conductor.

The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt, or other foreign material.

Authorities Having Jurisdiction should be consulted with regard to conditions under which those assemblies having receptacles with plugs will be permitted for use. It is recognized that portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Control Assembly Body for Hazardous Locations," "Control Assembly Cover for Hazardous Locations" or "Control Panel for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Control Assembly Covers for Use in Hazardous Locations (NNRL)

USE AND INSTALLATION

This category covers control assembly covers consisting of devices such as push-button stations, pilot lights, snap switches, motor controllers or receptacles certified for use only with specific models of certified control assembly bodies or plugs for hazardous locations as specified in the installation instructions provided with the cover.

The electrical components are provided as part of the product and are intended to be installed either at the factory or in the field by the user.

Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor-running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Overload units of motor controllers are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other certified ratings in order that proper overload units may be furnished. Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for ac horsepower ratings, and at 10 times motor full load running current for dc horsepower ratings.

Pilot lights without guards should be used only where not subject to breakage.

The plugs are for use with Type S, SO, ST or STO flexible cord having a grounding conductor. The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (NNGZ)

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Control Assembly Covers for Use in Hazardous Locations (NNRL)—Continued

should, therefore, not be used where the insulation may be impaired by moisture, dirt, or other foreign material.

Authorities Having Jurisdiction should be consulted with regard to conditions under which plugs and receptacles will be permitted for use. It is recognized that portable equipment should be used only where necessary. Receptacles and plugs certified for use in Class II, Group F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Control Panels and Assemblies for Use in Hazardous Locations (NNNY), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

CONTROL ASSEMBLY COVER FOR USE IN HAZARDOUS LOCATIONS FOR USE WITH LISTED * SPECIFIED IN THE INSTALLATION INSTRUCTIONS PROVIDED WITH THE PRODUCT

Control No.

* CONTROL ASSEMBLY BODIES or PLUGS

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Flame-control Panels for Use in Hazardous Locations (NNTE)

GENERAL

This category covers flame-control panels intended for application in the control of fossil-fuel-burning equipment, such as incinerators, kilns and drying ovens. Flame-control panels have been certified only as to electrical fire and shock hazards. The compatibility of the panel with the controlled equipment from the standpoint of programming the burner(s) and preventing hazardous conditions due to firing of fuel has not been determined.

ADDITIONAL INFORMATION

For additional information, see Control Panels and Assemblies for Use in Hazardous Locations (NNNY), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 508A, "Industrial Control Panels."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

FLAME-CONTROL PANEL FOR USE IN HAZARDOUS LOCATIONS AS TO FIRE, ELECTRICAL SHOCK AND EXPLOSION HAZARDS ONLY

No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ENCLOSED SLIP RINGS FOR USE IN HAZARDOUS LOCATIONS (NNTR)

USE AND INSTALLATION

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (NNGZ)

Enclosed Slip Rings for Use in Hazardous Locations (NNTR)—Continued

This category covers enclosed slip rings intended to transfer power to industrial equipment.

A terminal compartment is provided for connection to threaded rigid conduit systems.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Enclosed Slip Ring for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTOR CONTROLLERS FOR USE IN HAZARDOUS LOCATIONS (NNUX)

Motor controllers are Listed under the following categories with maximum ratings of 200 hp and/or 300 amp and 600 V:

- Auxiliary Devices
- Combination Motor Controllers
- Float- and Pressure-Operated Motor Controllers
- Magnetic Motor Controllers
- Manual Motor Controllers
- Miscellaneous Motor Controllers

Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, are tested at rated voltage and at six times motor full load running current for a-c horsepower ratings and at ten times motor full load running current for d-c horsepower ratings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Auxiliary Devices for Use in Hazardous Locations (NOIV)

USE AND INSTALLATION

This category covers auxiliary devices intended for use in control circuits of magnetic motor controllers and the like, and consist of the following devices: machine-operated switches, push-button stations (including pilot lights and selector switches), magnetically operated switches, and miscellaneous manually operated switches.

Auxiliary devices provided with a factory seal of conductors entering the pilot light or switch enclosure are so identified by a marking on the product.

Pilot lights without guards should be used only where not subject to breakage.

Enclosures furnished without mechanisms are marked to identify the mechanisms that are to be used.

RECONDITIONED PRODUCTS

This category also covers auxiliary devices that have been reconditioned. Reconditioned auxiliary devices may also be referred to as rebuilt. Reconditioned auxiliary devices are factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. The reconditioned auxiliary devices are subject to the same requirements as new auxiliary devices.

Auxiliary Devices for Use in Hazardous Locations (NOIV)—Continued

ADDITIONAL INFORMATION

For additional information, see Motor Controllers for Use in Hazardous Locations (NNUX), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Industrial Control Equipment for Hazardous Locations," "Industrial Control Equipment Enclosure for Hazardous Locations," "Industrial Control Equipment for Use in Hazardous Locations" or "Industrial Control Equipment Enclosure for Use in Hazardous Locations." The words "Industrial Control Equipment" may be abbreviated "Ind. Cont. Eq.,"; the words "Hazardous Locations" may be abbreviated "Haz. Loc."

For reconditioned products, the product name is preceded by "Reconditioned" or "Rebuilt."

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Combination Motor Controllers for Use in Hazardous Locations (NOTH)

GENERAL

This category covers combination motor controllers, which provide the motor branch-circuit functions of the motor controller, disconnect means, short-circuit and ground-fault protection and overload protection. The functions may be provided by individual discrete components or be combined in a single controller unit.

Combination motor controllers are marked "Combination Motor Controller" to signify that all of the motor branch-circuit functions indicated above have been investigated and are included in the certification of the controller.

Combination motor controllers are marked with a short-circuit rating and are intended for connection to circuits in which the available fault current does not exceed the marked short-circuit rating.

Enclosures furnished without mechanisms are marked to identify the mechanisms which should be used.

ADDITIONAL INFORMATION

For additional information, see Motor Controllers for Use in Hazardous Locations (NNUX) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Industrial Control Equipment for Hazardous Locations," "Industrial Control Equipment Enclosure for Hazardous Locations," "Industrial Control Equipment for Use in Hazardous Locations" or "Industrial Control Equipment Enclosure for Use in Hazardous Locations." The words "Industrial Control Equipment" may be abbreviated "Ind. Cont. Eq."

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Float- and Pressure-operated Motor Controllers for Use in Hazardous Locations (NOWT) USE

This category covers float- and pressure-operated switches, including vacuum-operated switches. These devices are for direct control of motors, use in control circuits of magnetic motor controllers and the like, and control of other types of loads.

Unless otherwise indicated on the individual products, these devices are intended for use only with air, water, or other nonhazardous fluids.

Unless otherwise indicated on the individual products, these devices are intended for use in an ambient temperature normally prevailing in habitable spaces, and for use with fluids at such a temperature.

These devices have not been investigated for use in connection with automatic sprinkler or similar protective equipment.

ADDITIONAL INFORMATION

For additional information, see Motor Controllers for Use in Hazardous Locations (NNUX), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment for Hazardous Locations" or "Industrial Control Equipment for Use in Hazardous Locations." The words "Industrial Control Equipment" may be abbreviated "Ind. Cont. Eq."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Magnetic Motor Controllers for Use in Hazardous Locations (NPKR)

GENERAL

This category covers magnetic cross-the-line starters.

Safety of operation of oil immersed-type starters will be endangered should the oil level be below the minimum shown by the indicator. These devices should be installed with a certified sealing fitting adjacent to each opening where threaded rigid conduit is connected.

Enclosures furnished without mechanisms are marked to identify the mechanisms which should be used.

RELATED PRODUCTS

Magnetic switches for controlling other than motor loads are covered under Auxiliary Devices for Use in Hazardous Locations (NOIV).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Industrial Control Equipment for Hazardous Locations," "Industrial Control Equipment Enclosure for Hazardous Locations," "Industrial Control Equipment for Use in Hazardous Locations" or "Industrial Control Equipment Enclosures for Use in Hazardous Locations." The words "Industrial Control Equipment" may be abbreviated "Ind. Cont. Eq."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

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Manual Motor Controllers for Use in Hazardous Locations (NPXZ)

GENERAL

This category covers manual across-the-line starters. Overload units are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other certified ratings in order that proper overload units may be furnished.

ADDITIONAL INFORMATION

For additional information, see Motor Controllers for Use in Hazardous Locations (NNUX), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment for Hazardous Locations" or "Industrial Control Equipment for Use in Hazardous Locations." The words "Industrial Control Equipment" may be abbreviated "Ind. Cont. Eq."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Miscellaneous Motor Controllers for Use in Hazardous Locations (NQLX)

USE

This category covers devices intended for direct control of motors. Unless otherwise indicated on the individual products, these devices are for use in an ambient temperature normally prevailing in habitable spaces, and for use with fluids at such a temperature. These devices have not been investigated for use in locations having automatic fire sprinklers.

RELATED PRODUCTS

Devices for use in control circuits of magnetic motor controllers and the like are covered under Auxiliary Devices for Use in Hazardous Locations (NOIV).

ADDITIONAL INFORMATION

For additional information, see Motor Controllers for Use in Hazardous Locations (NNUX), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment for Hazardous Locations" or "Industrial Control Equipment for Use in Hazardous Locations." The words "Industrial Control Equipment" may be abbreviated "Ind. Cont. Eq."

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Power Conversion Equipment for Use in Hazardous Locations (NQMD)

USE

This category covers equipment that supplies power to control a motor or motors operating at a frequency or voltage different than the input supply voltage. This category also includes power-supply modules, input and output modules, SCR or transistor output modules, dynamic braking modules, and input/output accessory kits for power conversion equipment. Power

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (NNGZ)

Power Conversion Equipment for Use in Hazardous Locations (NQMD)–Continued

conversion equipment may be of the open or enclosed type. This equipment is intended for use in hazardous (classified) locations in accordance with Article 500 of ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

Power conversion equipment incorporating overload protection for motors and not intended for remote or external motor overload protection is marked to indicate the level of protection provided in percent of full load current. Where such protection is adjustable, a marking with instructions for adjustment is provided. Equipment not providing motor overload protection is marked to indicate motor protection, such as thermal overload relays, or a thermally protected motor must be otherwise provided.

Power conversion equipment is marked with input and output electrical ratings.

ADDITIONAL INFORMATION

For additional information, see Motor Controllers for Use in Hazardous Locations (NNUX) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508C, "Power Conversion Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment for Use in Hazardous Locations" (or "Ind. Cont. Eq. for Use in Haz. Loc.") or "Power Conversion Equipment for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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MOTOR CONTROLLERS OVER 1500 VOLTS FOR USE IN HAZARDOUS LOCATIONS (NRAA)

GENERAL

This category covers enclosed motor controllers having ac voltage ratings in the ranges of 2.2 kV to 2.5 kV or 3.8 kV to 5.0 kV, intended for starting, stopping, regulating, controlling, or protecting electric motors or other electrical loads, including refrigeration equipment.

This equipment has been investigated for use on three-phase circuits having available fault levels not exceeding the MVA rating appearing on the nameplate. The three-phase available symmetrical MVA is equal to the product of the available symmetrical rms short-circuit current, the line-to-line open-circuit voltage, and a phase factor of 1.73 x 10⁶.

Motor controllers are intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, accordingly they are tested at six times the continuous current rating of the controller at rated voltage.

Some motor controllers are provided with an integrally mounted surge arrester to meet the required impulse withstand.

These motor controllers are substantially complete when shipped from the factory and final acceptability for service does not depend upon assembly of parts in the field.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 347, "High Voltage Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (NNGZ)

Motor Controllers Over 1500 Volts for Use in Hazardous Locations (NRAA)–Continued

“LISTED,” a control number, and the product name “High Voltage Industrial Control Equipment for Use in Hazardous Locations.”

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POWER CIRCUIT AND MOTOR-MOUNTED APPARATUS FOR USE IN HAZARDOUS LOCATIONS (NRAD)

GENERAL

This category covers autotransformers, including motor-starting and variable-voltage types; battery chargers for industrial use; magnetically operated brakes; busbars; magnetically operated clutches; enclosed slip rings; lamp dimmers, including incandescent, fluorescent, mercury vapor, surgical light and theater use; phase converters; power factor correction equipment; power supplies for industrial use; reactors, including line chokes; and resistors, including motor-starting, rheostats, potentiometers, and high-impedance grounding types.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, “Industrial Control Equipment.”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Industrial Control Equipment for Use in Hazardous Locations” (or “Ind. Cont. Eq. for Use in Hazardous Locations”).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PROGRAMMABLE CONTROLLERS FOR USE IN HAZARDOUS LOCATIONS (NRAG)

GENERAL

This category covers programmable industrial control systems utilizing a programmable memory for internal storage of user-oriented instructions for specific functions, such as logic, sequencing, counting, and controlling various industrial equipment through digital or analog inputs or outputs. This category also covers power supplies, central processing units, input and output accessories, computer interfaces and programming or program diagnostic units associated with programmable control systems.

All products covered under this category are marked with their electrical ratings. Output devices may have more than one rating. At least one rating is marked on the output device and additional ratings may be marked on an instruction sheet referenced on the output device.

This category does not cover primary safety controls intended for programming and monitoring the operation of the burner on gas-, gas-oil-, or oil-fired appliances.

This category does not cover programmable controllers intended for use in safety-related functions (i.e., functional-safety applications).

REBUILT PRODUCTS

This category also covers programmable controllers and their accessories that are rebuilt by the original manufacturer or the original manufacturer’s authorized manufacturer covered under this category. Rebuilt programmable controllers and their accessories are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt programmable controllers and their accessories are subject to the same requirements as new programmable controllers and their accessories.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (NNGZ)

Programmable Controllers for Use in Hazardous Locations (NRAG)–Continued

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, “Industrial Control Equipment.”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Industrial Control Equipment for Use in Hazardous Locations” (or “Ind. Cont. Eq. for Use in Haz. Loc.”), “Industrial Control Equipment for Hazardous Locations” (or “Ind. Cont. Eq. for Haz. Loc.”) or “Programmable Controller for Use in Hazardous Locations” (or “Prog. Cntrl. for Use in Haz. Loc.”), or other appropriate product name as shown in the individual Listings.

For rebuilt products the word “Rebuilt,” “Remanufactured,” “Reconditioned” or “Refurbished” precedes the product name.

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INDUSTRIAL CONTROL EQUIPMENT RELATING TO HAZARDOUS LOCATIONS (NRAW)

INDUSTRIAL CONTROL PANELS RELATING TO HAZARDOUS LOCATIONS (NRBX)

GENERAL

This category covers industrial control panels relating to hazardous locations, which are factory-wired assemblies of industrial control equipment such as motor controllers, switches, relays and auxiliary devices. The panels may include disconnect means and motor branch-circuit-protective devices.

Industrial control panels relating to hazardous locations are intended for installation in unclassified locations. They are provided with intrinsically safe (low energy) circuit(s) as indicated on the product, for extension into a hazardous (classified) location.

For intrinsically safe circuits, the energy level available in the hazardous location under normal and abnormal conditions is sufficiently low as not to cause ignition of the specified explosive atmospheres. To maintain the low energy levels, it is necessary that the intrinsically safe and associated equipment be installed and interconnected in accordance with the instructions provided. The intrinsically safe circuit wiring must be routed in a separate raceway or otherwise reliably segregated from all power and other circuit wiring to preclude excessive currents and voltages from being impressed on the intrinsically safe circuit, rendering it nonintrinsically safe.

The investigation of industrial control panels relating to hazardous locations does not include investigation of the function of the controlled equipment.

RELATED PRODUCTS

Industrial control panels for general use and for metal-working-machine tools for use in unclassified locations are covered under Industrial Control Panels (NITW).

Equipment that has been investigated for use only in the classified locations of automotive and marine service stations is covered under Control, Monitoring and Auxiliary Equipment (EQXX).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 508A, “Industrial Control Panels.”

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 698A, “Industrial Control Panels Relating to Hazardous (Classified) Locations.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up

PRODUCT CATEGORIES BY CATEGORY CODE

Industrial Control Panels Relating to Hazardous Locations
(NRBX)—Continued

Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Panel Relating to Hazardous Locations" or "Enclosed Industrial Control Panel Relating to Hazardous Locations" and the statement "with Intrinsically Safe Circuit Extensions."

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**MOTOR CONTROLLERS RELATING TO
HAZARDOUS LOCATIONS (NRCY)****GENERAL**

This category covers auxiliary devices and magnetic motor controllers.

These devices are for use in unclassified (ordinary) locations. They contain intrinsically safe circuits intended for extension into hazardous (classified) locations.

Motor controllers incorporating thermal cutouts, thermal relays or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motor with which they are intended to be used.

Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for a-c horsepower ratings, and at ten times motor full load running current for d-c horsepower ratings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**Auxiliary Devices Relating to Hazardous
Locations (NRDZ)****USE**

This category covers devices intended for use in control circuits of magnetic motor controllers and the like.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment Relating to Hazardous Locations."

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**INDUSTRIAL CONTROL EQUIPMENT
RELATING TO ZONE CLASSIFIED
HAZARDOUS LOCATIONS (NRFA)****INDUSTRIAL CONTROL PANELS RELATING
TO ZONE CLASSIFIED HAZARDOUS
LOCATIONS (NRFG)****GENERAL**

This category covers industrial control panels relating to zone classified hazardous locations, which are factory-wired assemblies of industrial control equipment such as motor controllers, switches, relays and auxiliary devices. The panels may include disconnect means and motor branch-circuit-protective devices.

Industrial control panels relating to zone classified hazardous locations are intended for installation in unclassified locations. They are provided with intrinsically safe (low energy) circuit(s) as indicated on the product, for extension into a hazardous (classified) location.

For intrinsically safe circuits, the energy level available in the hazardous location under normal and abnormal conditions is sufficiently low as not to cause ignition of the specified explosive atmospheres. To maintain the low energy levels, it is necessary that the intrinsically safe and associated equipment be installed and interconnected in accordance with the instructions provided. The intrinsically safe circuit wiring must be routed in a separate raceway or otherwise reliably segregated from all power and other circuit wiring to preclude excessive currents and voltages from being impressed on the intrinsically safe circuit, rendering it nonintrinsically safe.

The investigation of industrial control panels relating to zone classified hazardous locations does not include investigation of the function of the controlled equipment.

RELATED PRODUCTS

Industrial control panels for general use and for metal-working-machine tools for use in unclassified locations are covered under Industrial Control Panels (NITW).

Equipment that has been investigated for use only in the classified locations of automotive and marine service stations is covered under Control, Monitoring and Auxiliary Equipment (EQXX).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 508A, "Industrial Control Panels."

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 698A, "Industrial Control Panels Relating to Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Panel Relating to Zone Classified Hazardous Locations with Intrinsically Safe Circuit Extensions" or "Enclosed Industrial Control Panel Relating to Zone Classified Hazardous Locations with Intrinsically Safe Circuit Extensions." The words "Hazardous Locations" may be abbreviated "Haz. Loc."

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**INDUSTRIAL CONTROL EQUIPMENT
FOR USE IN ZONE CLASSIFIED
HAZARDOUS LOCATIONS (NWEX)**

The Listing covers the following products:

Control Panels and Assemblies

Motor Controllers

Programmable Controllers

Enclosed industrial control equipment is intended for use as indicated in the general guide information at the front of Part II of this directory.

Industrial Control Equipment is for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (NWEX)

Industrial Control Equipment, for which accessory kits are available for the field or distributor modification of the basic product or which may be assembled in many forms from separate components are marked to indicate the suitable accessories or separate components which may be used.

If the rating of the operating coil circuit of a magnetically operated industrial control device exceeds 125 volt-amperes, the coil circuit rating is marked on the device.

Overload relays or industrial control equipment incorporating overload relays are identified as to their maximum tripping time at 600 per cent of the overload relay current element trip rating. The designations "Class 10, Class 20 and Class 30" are used to identify the maximum tripping times, with the Class number indicating the maximum tripping time in seconds. Overload relays with maximum tripping times of 10 or 30 seconds are marked Class 10 or Class 30 respectively. Overload relays with a maximum tripping time of 20 seconds may be marked Class 20. Overload relays with tripping times in excess of 30 seconds are marked with their maximum tripping times. All unmarked overload relays have a maximum tripping time of 20 seconds.

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CONTROL PANELS AND ASSEMBLIES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (NWFA)

USE AND INSTALLATION

This category covers control panels and assemblies consisting of enclosures and electrical components such as push button stations, pilot lights, motor controllers, and receptacles with plugs.

A single enclosure or a group of interconnected (modular) enclosures may be used for mounting the electrical components.

The enclosures making up a modular assembly are intended to be interconnected either at the factory or in the field by the user. Limitations on the interconnection of the enclosures are given on or with the product. Modular assemblies must be installed in accordance with the installation instructions provided with each part.

The electrical components are provided as part of the product and are intended to be installed either at the factory or in the field by the user.

It is intended that wiring between the electrical components of modular assemblies be field installed.

Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Overload units of motor controllers are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other certified ratings in order that proper overload units may be furnished. Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for AC horsepower ratings and at 10 times motor full load running current for DC horsepower ratings.

Pilot lights without guards should be used only where not subject to breakage.

Receptacles with plugs included on certified assemblies have been subjected to endurance and overload operation tests in the presence of the specific flammable atmospheres for Class I locations.

The plugs of the receptacle-plug combinations are for use with extra hard usage flexible cord with grounding conductor.

The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt, or other foreign material.

Authorities Having Jurisdiction should be consulted with regard to conditions under which those assemblies having receptacles with plugs will be permitted for use. It is recognized that portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are indicated in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (NWEX)

Control Panels and Assemblies for Use in Zone Classified Hazardous Locations (NWFA)—Continued

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Control Panel for Use in Hazardous Locations," "Control Assembly Cover for Use in Hazardous Locations" or "Control Assembly Body for Use in Hazardous Locations."

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ENCLOSED SLIP RINGS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (NWFC)

USE AND INSTALLATION

This category covers enclosed slip rings intended to transfer power to industrial equipment.

A terminal compartment is provided for connection to threaded rigid conduit systems.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment for Use in Zone Classified Hazardous Locations (NWEX) and Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Enclosed Slip Ring for Use in Hazardous Locations."

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MOTOR CONTROLLERS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (NWFE)

Motor controllers are Listed under the following categories:

- Auxiliary Devices
- Combination Motor Controllers
- Float-and Pressure-Operated Motor Controllers
- Magnetic Motor Controllers
- Manual Motor Controllers
- Miscellaneous Motor Controllers

Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, are tested at rated voltage and at six times motor full load running current for a-c horsepower ratings and at ten times motor full load running current for d-c horsepower ratings.

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PRODUCT CATEGORIES BY CATEGORY CODE

**Auxiliary Devices for Use in Zone Classified
Hazardous Locations (NWFN)**

GENERAL

This category covers devices such as machine-operated switches, push-button stations (including parts, such as pilot lights, meters, terminal blocks and selector switches), magnetically operated switches, and miscellaneous manually operated switches intended for use in control circuits of magnetic motor controllers, and the like.

Pilot lights without guards should be used only where not subject to breakage.

Auxiliary devices provided with a factory seal of conductors entering the pilot light or switch enclosure are so identified by a marking on the product.

Enclosures furnished without mechanisms are marked to identify the mechanisms intended to be used.

REBUILT PRODUCTS

This category also covers auxiliary devices that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt auxiliary devices are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt auxiliary devices are subject to the same requirements as new auxiliary devices.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations," "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Hazardous Locations," "Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations," "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

For rebuilt products the word "Rebuilt" or "Reconditioned" precedes the product name.

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**Combination Motor Controllers for Use in Zone
Classified Hazardous Locations (NWFP)**

GENERAL

This category covers combination motor controllers.

Combination motor controllers provide the motor branch-circuit functions of motor controller, disconnect means, short-circuit and ground-fault protection and overload protection. The functions may be provided by individual discrete components or be combined in a single controller unit.

Combination motor controllers are marked "Combination Motor Controller" to signify that all of the motor branch-circuit functions indicated above have been investigated and are included in the certification of the controller.

Combination motor controllers are marked with a short-circuit rating and are intended for connection to circuits in which the available fault current does not exceed the marked short-circuit rating.

Enclosures furnished without mechanisms are marked to identify the mechanisms that should be used.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations," "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure

**Combination Motor Controllers for Use in Zone Classified
Hazardous Locations (NWFP)—Continued**

for Hazardous Locations," "Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations" or "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Use in Hazardous Locations."

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**Magnetic Motor Controllers for Use in Zone
Classified Hazardous Locations (NWFR)**

USE

This category covers magnetic across-the-line starters.

The safety of operation of oil-immersed-type starters will be endangered should the oil level be below the minimum shown by indicator. These devices should be installed with a certified sealing fitting adjacent to each opening where threaded rigid conduit is connected.

Enclosures furnished without mechanisms are marked to identify the mechanisms that should be used.

RELATED PRODUCTS

Magnetic switches for controlling other than motor loads are covered under Auxiliary Devices for Use in Zone Classified Hazardous Locations (NWFN).

ADDITIONAL INFORMATION

For additional information, see Motor Controllers for Use in Zone Classified Hazardous Locations (NWFP), Industrial Control Equipment for Use in Zone Classified Hazardous Locations (NWEX) and Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations," "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Hazardous Locations," "Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations," "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosures for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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**Manual Motor Controllers for Use in Zone
Classified Hazardous Locations (NWFU)**

GENERAL

This category covers manual across-the-line starters.

Overload units are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to the use of a controller for other certified ratings in order that proper overload units may be furnished.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations" or "Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

**INDUSTRIAL CONTROL EQUIPMENT FOR USE IN ZONE
CLASSIFIED HAZARDOUS LOCATIONS (NWEX)**
**Manual Motor Controllers for Use in Zone Classified
Hazardous Locations (NWFU)—Continued**

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**PROGRAMMABLE CONTROLLERS FOR
USE IN ZONE CLASSIFIED HAZARDOUS
LOCATIONS (NWGD)**
USE AND INSTALLATION

This category covers programmable industrial control systems utilizing a programmable memory for internal storage of user oriented instructions for specific functions such as logic, sequencing, counting, and controlling various industrial equipment through digital or analog inputs or outputs. This category also includes power supplies, central processing units, input and output accessories, computer interfaces and programming or program diagnostic units associated with programmable control systems.

This category does not cover primary safety controls intended for programming and monitoring the operation of the burner on gas-, gas-oil-, or oil-fired appliances.

RECONDITIONED PRODUCTS

This category also covers programmable controllers and their accessories that have been reconditioned. Reconditioned programmable controllers and their accessories are factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. The reconditioned programmable controllers and their accessories are subject to the same requirements as new programmable controllers and their accessories.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment for Use in Zone Classified Hazardous Locations (NWEX) and Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Industrial Control Equipment for Use in Hazardous Locations" (or "Ind. Cont. Eq. for Use in Haz. Loc.") or "Industrial Control Equipment for Hazardous Locations" (or "Ind. Cont. Eq. for Haz. Loc.") or other appropriate product name as shown in the individual Listings.

For reconditioned products the product name is preceded by the word "Reconditioned," "Rebuilt," "Remanufactured" or "Refurbished."

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**INFORMATION TECHNOLOGY
EQUIPMENT INCLUDING
ELECTRICAL BUSINESS EQUIPMENT
(NWGQ)**
USE

This category covers equipment, appliances and systems rated 600 V or less normally found in offices and other business establishments, residences (homes), educational facilities, and other similar environments classified as ordinary locations.

This equipment has been investigated for installation in information technology equipment (computer) rooms as defined in ANSI/NFPA 75, "Fire Protection of Information Technology Equipment," and Article 645 of ANSI/NFPA 70, "National Electrical Code" (NEC), unless the equipment is otherwise identified by a marking or instruction.

EQUIPMENT TYPES

Equipment may be electronic or electromechanical in design or a combination thereof.

**INFORMATION TECHNOLOGY EQUIPMENT INCLUDING
ELECTRICAL BUSINESS EQUIPMENT (NWGQ)**

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Various groupings of equipment are covered under this category, such as:

Displays: Flat-panel displays, LCD displays, monitors, plasma displays.

Information processing equipment: Central processing units (CPUs), hand-held computers (personal assistants), laptop computers, notebook computers, pen-based computers, personal computers, point-of-sale terminals, scanners (including portable barcode scanners), servers, work stations. **Accessories:** Docking stations, flash memory cards, keyboards, mouse, PCMCIA-memory-modem cards, port replicators, trackballs.

Information storage equipment: Automated information storage equipment, CD-ROM/RW drives, disk drives, DVD drives, tape drives, optical drives.

Telecommunication equipment: Cellular site equipment, cordless telephone sets, facsimile machines, ISDN systems and telephones, modems, key telephone systems, powerline communication equipment, private automated branch exchanges (PABXs), telephone answering machines, telephone sets, voicemail systems, IP telephones, IP systems, wireless telephony systems.

Office appliances: Adding machines, bursters, calculators, collators, dication and transcribing machines, electric typewriters, erasers, folding, embossing and sealing machines, label printers, microfilm readers, motor-operated file cabinets, overhead projectors, paper cutters, paper shredders, pencil sharpeners, sorters, stackers, staplers.

Printers/Reproduction equipment: Copiers, duplicating machines, microfilm printers, mimeograph machines, plotters, printers.

Mailing, banking and currency-handling equipment: Cash registers, coin counters, feeders and dispensers, accounting machines, check-writing, -assigning, -dating, -inserting, -mailing, -numbering and -stamping machines, point-of-sale terminals.

Multimedia equipment/accessories: Cable modems, digital cameras, DLP projectors, LCD projectors, microphones, set-top boxes, speakers, video conferencing systems.

Network equipment: Baluns, bridges, fiber optic transceivers, hubs, nodes, Power over Ethernet (PoE) equipment (e.g., power source equipment [PSE] and powered devices [PD]), repeaters, routers, switches, transceivers.

Wireless (RF, infrared) transceiving equipment: RF modems, hand-held computers with integral transceivers.

Static-neutralizing equipment: Power units with discharge bars used with or within copiers, collators, film-plate processors, digital printers, duplicating machines and similar equipment.

Interconnecting cable assemblies: Cable assemblies intended for use beneath raised floors of computer rooms. These assemblies are also covered under Computer Interconnection Cable Assemblies (DVPJ).

Included within the above groupings is equipment which is battery powered, either by standard-size consumer-replaceable batteries (e.g., AA, C, D), or nonstandard sizes specified by manufacturer, type and ratings.

This category also covers power distribution units (PDUs) and computer power centers investigated as part of a computer system for use exclusively in information technology equipment (computer) rooms in accordance with Article 645 of the NEC. This equipment is connected to branch circuits unless otherwise indicated in the manufacturer's installation instructions, and it distributes power to other units in the computer system by means of interconnecting cable assemblies complying with one or more of the wiring methods outlined in Article 645 of the NEC. Many of these units require special installation, such as a separate transformer, special grounding methods, motor-generator equipment, air conditioning, etc. Such features are covered in the manufacturer's installation instructions.

INSTALLATION

Some equipment has been investigated for installation in a restricted access location, such as a dedicated equipment room or telecommunication equipment closet, where access is limited to trained service personnel. Such equipment is provided with a marking or installation instructions that state "To be installed only in a Restricted Access Location," or similar wording. If also intended for installation over a concrete or noncombustible surface, such equipment will also be marked "Suitable for mounting on concrete or other noncombustible surface only," or similar wording.

Equipment installed in a restricted access location generally receives power from a centralized d.c. power source. If field wiring terminals are not contained in an internal compartment, both protection of exposed wiring terminals and wiring methods used for such equipment are intended to be provided in accordance with (1) markings on or instructions with the equipment, and (2) the provisions of Sections 110.26 and 110.27 of the NEC.

Products such as LAN transceivers and baluns investigated for use in air-handling spaces are marked "Suitable for Use in Other Environmental Air Space in Accordance with Section 300.22, (C) of the National Electrical Code" or "Suitable for Use in Air Handling Spaces." These products have been additionally investigated to UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and their Accessories Installed in Air-Handling Spaces." Products that bear the marking are suitable for installation in accordance with Section 300 of the NEC, Chapter 4 of ANSI/NFPA

**INFORMATION TECHNOLOGY EQUIPMENT INCLUDING
ELECTRICAL BUSINESS EQUIPMENT (NWGQ)**

90A, "Installation of Air-Conditioning and Ventilating Systems," Section 602 of the "International Mechanical Code," and Section 602 of the "Uniform Mechanical Code."

When certified equipment intended for use with a detachable power-supply cord is not provided with such a cord, a cord suitable for connection of the equipment to the branch circuit should be separately provided.

Equipment intended to be installed in closed and multiunit standard racks and cabinets has been determined to be suitable for use in ambient temperatures not exceeding the manufacturer's recommended ambient temperature as specified in the equipment's installation instructions.

Equipment identified with an Enclosure Type designation, or as "Rain-tight" or "Rainproof," is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

ACCESSORIES

Field-installed accessories to certified equipment are provided with suitable markings and/or instructions detailing proper installation or assembly of the accessory with either a specific or generic certified equipment specified in the markings or instructions.

OUTPUT CONNECTORS/CIRCUITS

Class 2 circuits are marked "Class 2." All other output circuits, including those associated with the Universal Serial Bus (USB), IEEE 1394 bus and PS/2 connectors are limited-power circuits supplied by ANSI/UL 60950-1 limited-power sources, unless:

- the circuits are clearly telecommunication circuits (e.g., RJ series modular jack, 50-pin commercial connectors with insulation-piercing terminals). These circuits are limited to telecommunication network voltages (TNV) and are suitable for connection to the telecommunication network and distribution wiring in accordance with Article 800 of the NEC; or
- the circuits are marked, or otherwise identified in the installation instructions with the type of circuit (e.g., Class 1), intended cable type (e.g., DP-2) or specific equipment intended to be interconnected (e.g., mfr/model printer).

Limited-power circuits of certified ITE supplied by limited-power sources are recognized by Section 725.41(A)(4) of the NEC as being equivalent to Class 2 circuits for purposes of applying Article 725 Class 2 wiring requirements.

SPECIAL CONSIDERATIONS

The ability or reliability of these products to perform their intended function in a particular application has not been investigated.

Equipment investigated with respect to security or burglary resistance is covered under Access Control System Units (ALVY), Antitheft Alarms and Devices (ATJ) and other associated categories. Card readers, badge readers and similar identification equipment covered under this category has not been investigated with respect to security.

The burglary and theft protection features of coin-operated equipment, banking and currency-handling equipment, cash registers, coin counters and the like have not been investigated.

Automated teller machines (ATMs) investigated for security and burglary resistance are covered under Automated Teller Systems (TPEU). ATMs that have not been investigated for security protection are covered under Bank Equipment (BALT).

PHYSIOLOGICAL EFFECTS

The physiological effects of chemical substances used in or with this equipment have not been investigated.

The long-term characteristics or the possible physiological effects of radio frequency (RF) electromagnetic fields associated with this equipment have not been investigated.

RELATED EQUIPMENT

Power distribution centers for communications equipment are covered under Power Distribution Centers for Communications Equipment (QPQY).

Uninterruptible power-supply (UPS) equipment intended for indoor and outdoor use that may be stationary or fixed is covered under Uninterruptible Power-supply Equipment (YEDU).

Automatic transfer switches intended for use in optional standby systems in accordance with Article 702 of the NEC are covered under Automatic Transfer Switches for use in Optional Standby Systems (WPXI).

Power supplies for information technology and telecommunication equipment are covered under Power Supplies, Information Technology Equipment Including Electrical Business Equipment (QGGQ) and Power Supplies, Telephone (QQJE).

Secondary (rechargeable) battery packs for use in transportable equipment are covered under Batteries, Household and Commercial (BBFS).

Static neutralizing equipment is covered under Static Neutralizing Equipment (VWWZ). High-voltage parts that may be accessible after installation have been investigated as limited-current circuits.

Air conditioning equipment for use in computer rooms or other areas in which information technology equipment is installed is covered under Air Conditioners, Special Purpose (ACVS) and Heating and Cooling Equipment (LZFE).

**INFORMATION TECHNOLOGY EQUIPMENT INCLUDING
ELECTRICAL BUSINESS EQUIPMENT (NWGQ)**

Fire-resistant materials, sprinklers, extinguishers and associated equipment intended for use in computer rooms is covered under Carbon Dioxide Extinguishers (FXHV) and Halogenated Agent Extinguishing System Units (GLER).

Filing cabinets covered under this category have not been investigated with respect to fire resistance or security. Fire-resistant filing cabinets are covered under Record Protection Equipment (RYPH).

Smoke detectors are covered under Smoke-automatic Fire Detectors (UROX); alarm equipment is covered under Single- and Multiple-station Smoke Alarms (UTGT).

Other equipment associated with information technology/processing but not intended for use in offices, residences or computer rooms is covered under Graphics Arts Equipment (KCQT), Inspection and Measuring Electrical Equipment (NYOK), Teaching and Instruction Equipment (WYFW), Laboratory Use Electrical Equipment (OGTK), Medical Equipment (PIDF), Marking and Coding Equipment, Electronic (PGBE) and Photographic Equipment (QINT). Other multimedia equipment and accessories are covered under Audio/Video Apparatus (AZSQ) and Audio and Video Equipment (AZUJ). Other telecommunication appliances and equipment is covered under Telephone Appliances and Equipment (WYQQ).

Modular assemblies of telecommunication equipment (e.g., racks, circuit card assemblies) designed for field installation by trained service personnel are covered under Custom-built Telecommunication Equipment (WYKM).

Equipment intended to be installed on the network side of the subscriber demarcation point and installed and maintained by telephone companies, CATV companies and similar network communication companies, is covered under Communication Service Equipment (DUZO).

Cabinet, enclosure and rack/frame systems that are not complete information technology (IT) or telecommunication equipment, but include components and assemblies that are intended to power, protect, heat, cool of otherwise support IT or telecommunication equipment that will be installed at a later time are covered under Information Technology and Telecommunication Equipment Cabinets, Enclosures and Racks (NWIN).

Power distribution products intended for indoor use as relocatable multiple-outlet extensions of a single branch circuit not for exclusive use of ITE and consisting of an attachment plug and a single length of flexible cord terminated in a single enclosure in which one or more receptacles are mounted are covered under Relocatable Power Taps (XBYS).

Power distribution products intended for installation in modular furniture are covered under Furniture Power Distribution Units (IYNQ).

Equipment intended to protect against mains transients is covered under Surge-protective Devices (VZCA).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 60950-1, "Information Technology Equipment - Safety - Part 1: General Requirements," in conjunction with ANSI/UL 60950-21, "Information Technology Equipment - Safety - Part 21: Remote Power Feeding," ANSI/UL 60950-22, "Information Technology Equipment - Safety - Part 22: Equipment to be Installed Outdoors," and/or ANSI/UL 60950-23, "Information Technology Equipment - Safety - Part 23: Large Data Storage Equipment."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number or file number, and one of the following category identifiers: "UL 1950," "UL 60950," "UL 60950-1," "Information Technology Equipment" (or "Info. Tech. Equip.," "I.T.E." or "ITE"), "NWGQ," or the standard number with or without the "ANSI/UL" prefix (e.g., "ANSI/UL 60950-1," "60950-1"). The Listing Mark may also include one of the following product names: "Copier," "Modem," "Paper Shredder," "Personal Computer," "Cordless Telephone," or other appropriate product name as shown in the individual Listings.

The category identifier for field-installed accessories includes the word "Accessory."

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INFORMATION TECHNOLOGY EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (NWHC)

GENERAL

This category covers information technology equipment for use in hazardous (classified) locations such as, but not limited to, personal computers, card readers and printers, rated 600 V or less, normally used in business establishments and other similar environments.

The equipment and appliances may be electromechanical and/or electronic.

SPECIAL CONSIDERATIONS

Card readers, badge readers and similar identification equipment covered under this category has not been investigated with respect to security or burglary resistance.

PHYSIOLOGICAL EFFECTS

The physiological effects of chemical substances used in or with this equipment have not been investigated.

The long-term characteristics or the possible physiological effects of radio frequency (RF) electromagnetic fields associated with this equipment have not been investigated. Hand-held transportable RF products that interconnect to the telecommunication network through RF transmitters/receivers are additionally investigated for short-term characteristics to ANSI/IEEE C95.1 (1999), "Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz."

RELATED EQUIPMENT

Graphic display and touch panel equipment for information technology and telecommunications equipment is covered under Programmable Controllers for Use in Zone Classified Hazardous Locations (NWGD).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 60950-1, "Information Technology Equipment – Safety – Part 1: General Requirements."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

The ability or reliability of these products to perform their intended function in a particular application has not been investigated.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Information Technology Equipment for Use in Hazardous Locations" (or "I.T.E. for Use in Hazardous Locations") or other appropriate product name as shown in the individual Listings.

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INFORMATION TECHNOLOGY EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (NWHP)

GENERAL

This category covers information technology equipment such as, but not limited to, personal computers, card readers and printers, rated 600 V or less, normally used in business establishments and other similar environments.

The equipment and appliances may be electromechanical and/or electronic.

REBUILT PRODUCTS

This category also covers information technology equipment that is rebuilt by the original manufacturer or the original manufacturer's authorized manufacturer covered under this category. Rebuilt information technology equipment is rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt information technol-

ogy equipment is subject to the same requirements as new information technology equipment, including production-line tests as applicable.

SPECIAL CONSIDERATIONS

Card readers, badge readers and similar identification equipment covered under this category have not been investigated with respect to security.

PHYSIOLOGICAL EFFECTS

The physiological effects of chemical substances used in or with this equipment have not been investigated.

The long-term characteristics or the possible physiological effects of radio frequency (RF) electromagnetic fields associated with this equipment have not been investigated. Hand-held transportable RF products that interconnect to the telecommunication network through RF transmitters/receivers are additionally investigated for short-term characteristics to ANSI/IEEE C95.1 (1999), "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz."

RELATED EQUIPMENT

Graphic display and touch-panel equipment for information technology and telecommunications equipment is covered under Programmable Controllers for Use in Hazardous Locations (NRAG).

Card readers and data-entry-terminal equipment for information technology and telecommunications equipment is covered under Office Appliances and Business Equipment for Use in Hazardous Locations (QAVS).

Scanner and barcode-reader equipment for information technology and telecommunications equipment is covered under Data Processing Equipment, Electronic for Use in Hazardous Locations (ENWS).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 60950-1, "Information Technology Equipment – Safety – Part 1: General Requirements."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Information Technology Equipment for Hazardous Locations" (or "Info. Tech. Equip. for Hazardous Locations," "Info. Tech. Equip. for Haz. Loc.," "I.T.E. for Hazardous Locations" or "I.T.E. for Haz. Loc.") or "Information Technology Equipment for Use in Hazardous Locations" (or "Info. Tech. Equip. for Use in Hazardous Locations," "Info. Tech. Equip. for Use in Haz. Loc.," "I.T.E. for Use in Hazardous Locations" or "I.T.E. for Use in Haz. Loc."), or other appropriate product name as shown in the individual Listings.

For rebuilt products, the word "Rebuilt," "Remanufactured," "Reconditioned" or "Refurbished" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AUDIO/VIDEO, INFORMATION AND COMMUNICATION TECHNOLOGY EQUIPMENT CABINET, ENCLOSURE AND RACK SYSTEMS (NWIN)

GENERAL

This category covers cabinet, enclosure and rack/frame systems that are not complete but include components and assemblies that are intended to power, protect, heat, cool, or otherwise support information technology (IT) or telecommunications equipment, audio/video equipment (A/V), or the like that will be installed at a later time. They usually include mounting hardware, shelves or space for the installation of additional electronic equipment. These cabinet, enclosure and rack/frame systems are intended to be used by manufacturers in the construction of complete IT and communications equipment, or by service providers for the installation of network infrastructure equipment.

Equipment identified in the individual Listings as an enclosure is constructed to provide a degree of protection to personnel against accidental contact with equipment, parts involving a risk of personal injury or ener-

**AUDIO/VIDEO, INFORMATION AND COMMUNICATION
TECHNOLOGY EQUIPMENT CABINET, ENCLOSURE AND
RACK SYSTEMS (NWIN)**

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gized parts. It is also constructed to minimize the spread of fire or flames from within and to provide a degree of protection to the enclosed equipment against physical damage or specified environmental conditions.

Equipment identified in the individual Listings as an equipment cabinet is a closed storage system with a surrounding case or housing that does not provide the degrees of protection of an enclosure. An equipment cabinet is used to store or mount equipment that is provided with its own enclosure or may be used in place of an equipment enclosure if in a restricted-access location that is limited to access by service personnel only. Equipment cabinets are intended for indoor installation only.

Equipment identified in the individual Listings as an equipment frame or equipment rack is an open-frame mounting system, usually either in a two-post or four-post frame design that does not provide the degrees of protection of an enclosure. A frame or rack is used to store or mount equipment that is provided with its own enclosure or is intended for use only in restricted-access locations limited to service personnel only. Frames and racks are intended for indoor installations only or in outdoor environments when additionally installed in a suitably rated enclosure.

A marking includes a configuration list, or diagram of the components, and assemblies provided with the product covered under the system category. It is the responsibility of the Authority Having Jurisdiction over the final installation to determine if the final configuration meets the necessary criteria for installation and use.

As appropriate, this equipment is intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), and/or the applicable sections of ANSI C2, "National Electrical Safety Code." Equipment intended for installation in information technology equipment (computer) rooms is intended to be installed in accordance with ANSI/NFPA 75, "Fire Protection of Information Technology Equipment."

Equipment covered under this category includes, but is not limited to, indoor and outdoor cabinets and enclosures, racks, frames (nonenvironmentally controlled cabinets, pedestals, enclosures, etc.), and the like. For the purpose of identification in this Guide Information, all of the equipment (cabinets, racks and enclosures) covered under this category is referred to as "ITC equipment cabinets."

Equipment intended for outdoor use is marked with an Enclosure Type rating, or as "Raintight" or "Rainproof," and provides a degree of protection as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ). The absence of a Type rating will presume no environmental conditions have been assessed, and will automatically designate the equipment with a "Type 0" rating. Cabinets and enclosures may incorporate multiple Type designations for differing compartments if marked on the equipment. In addition, equipment may optionally be investigated and marked for ingress protection in accordance with IEC 60529, "Degrees of Protection Provided by Enclosures (IP Code)." IP codes are not intended to replace Type ratings.

Except for equipment identified with a specific temperature range, outdoor equipment has been investigated over a temperature range of -33°C to +40°C. The effects of insolation (solar loading) have also been considered.

For equipment containing Listed primary protectors for telecommunications circuits (see QVGV), the individual Listing information for the protectors should be consulted for information regarding the installation and use of the protectors.

INSTALLATION

Some ITC equipment cabinet, enclosure, and rack/frame systems have been investigated for installation in a restricted access location, such as a dedicated equipment room or telecommunications equipment closet, where access is limited to trained service personnel. Such ITC equipment is provided with a marking or installation instructions which state "To be installed only in a Restricted Access Location," or similar wording. If also intended for installation over a concrete or noncombustible surface, such equipment is also marked "Suitable for mounting on concrete or other noncombustible surface only," or similar wording.

Equipment installed in a restricted access location generally receives power from a centralized dc power source. If field-wiring terminals are not contained in an internal compartment, both protection of exposed wiring terminals and wiring methods used for such equipment are intended to be provided in accordance with (1) markings on or instructions with the equipment, and (2) the provisions of Sections 110.26 and 110.27 of the NEC.

All wiring is intended to conform to the NEC. Wiring in an IT equipment (computer) room is intended to conform to Article 645 of the NEC.

ACCESSORIES

Field-installed accessories to Listed equipment are provided with suitable markings and/or instructions detailing proper installation or assembly of the accessory with Listed equipment as specified in the markings or instructions.

PRODUCT MARKINGS

The product marking includes a configuration list or diagram of components and accessories when included with the product.

Equipment containing service equipment is marked with the service panel input and output ratings. Short-circuit capacity may additionally be investigated and marked.

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TECHNOLOGY EQUIPMENT CABINET, ENCLOSURE AND RACK
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Equipment containing air conditioning or heat exchangers is marked with the BTU rating for the heat it can eliminate from the equipment interior. This rating is based solely on the manufacturer's specifications and has not been investigated or verified by UL. In addition, the heat-release data for any installed equipment that is part of the cabinet system is also included. The heat release from power supplies is specified for the power supply operating under full load (basically the inefficiency of the power conversion process) but the heat release from powered equipment not included as part of the cabinet system is not included.

Equipment containing ac or dc power supplies or distribution is marked with an appropriate electrical rating for the power it can provide to installed units.

Products investigated for use in other spaces used for environmental air (spaces not specifically fabricated for environmental air-handling purposes but used for air-handling purposes, such as a plenum) are marked "Suitable for Use in Other Space Used for Environmental Air (Plenums)," "Suitable for Use in Air-handling Spaces," or equivalent wording. When these products employ combustible outer enclosures they have been additionally investigated to UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces." Products that bear one of the aforementioned markings are suitable for installation in accordance with Article 300 of the NEC, Chapter 4 of ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," Section 602 of the "International Mechanical Code," and Section 602 of the "Uniform Mechanical Code." These enclosure systems are considered to have adequate fire-resistant and low-smoke-producing characteristics and limit the amount of smoke that can escape into the air-handling space.

FACTORS NOT INVESTIGATED

Other features that may affect the operation or performance of the installed equipment have not been investigated.

RELATED PRODUCTS

Complete ITC equipment cabinets are covered under Information Technology Equipment Including Electrical Business Equipment (NWGQ), Telephone Appliances and Equipment (WYQQ), Communication Service Equipment (DUZO), Custom-built Telecommunications Equipment (WYKM), Communications-circuit Accessories (DUXR), Audio and Video Equipment (AZU), Audio and Radio Equipment, Commercial (AZCY), Commercial Audio and Radio Equipment, Systems and Accessories (AZIX), Commercial Phonographs, Tape-playing and Recording Appliances and Accessories (AZQW), Audio/Video Apparatus (AZSQ), Closed-circuit Television Equipment (DRQH), Television/Video Equipment for Use in Health Care Facilities (KFCV), Video and Audio Equipment, Professional (ZCBB), and similar categories that cover complete equipment.

Cabinets and enclosures that do not include any additional components or assemblies may also be covered under Industrial Control Panels (NITW) and investigated to ANSI/UL 50, "Enclosures for Electrical Equipment."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL 2416, "Outline of Investigation for Audio/Video, Information and Communication Technology Equipment Cabinet, Enclosure and Rack Systems."

Outdoor Type ratings are investigated to ANSI/UL 50E, "Enclosures for Electrical Equipment, Environmental Considerations."

Alternative tests for "Raintight" and "Rainproof" designations are found in UL 2416.

Components, assemblies and subassemblies provided/installed as part of enclosure, cabinet or rack systems are investigated to the applicable UL requirements as appropriate for the component, assembly or subassembly. Some examples are:

Protectors for paired-conductor communications circuits (see QVGV) are investigated to ANSI/UL 497, "Protectors for Paired Conductor Communications Circuits."

Service equipment is investigated to UL 869A, "Reference Standard for Service Equipment."

Special-purpose air conditioners (see ACVS) are investigated to ANSI/UL 484, "Room Air Conditioners."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number or file number, and one of the following product names: "Enclosure System," "Cabinet System," "Rack System," preceded by "Telecom," "Telecommunications," "Communications," "IT," "ITC," "A/V," "CATV," a specific application such as "Cell System," "Wireless" or "Remote Terminal," or other appropriate product name as shown in the individual Listings.

For field-installed accessories, the product name includes the word "Accessory."

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TECHNOLOGY EQUIPMENT CABINET, ENCLOSURE AND
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**INSPECTION AND MEASURING
ELECTRICAL EQUIPMENT (NYOK)**

USE

This category covers equipment intended primarily for the purpose of identifying, examining and investigating materials, and making measurements and tests such as might be associated with manufacturing processes and quality control procedures.

FACTORS NOT INVESTIGATED

These products have been investigated with respect to risk of fire, shock and injury to persons. The accuracy of measured, analyzed or prepared quantities has not been investigated.

RELATED PRODUCTS

Inspection and measuring equipment for specialized use is covered under appropriate product categories such as Garage Equipment (JGWV) and Photographic Equipment (QINT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 61010A-1, "Electrical Equipment for Laboratory Use; Part 1: General Requirements," or ANSI/UL 61010-1, "Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Inspection Equipment" or "Measuring Equipment," or the name of the specific type of product as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**INSPECTION AND MEASURING
ELECTRICAL EQUIPMENT FOR USE
IN ZONE CLASSIFIED HAZARDOUS
LOCATIONS (NYPA)**

USE

This category covers equipment intended primarily for the purpose of identifying, examining and investigating materials, and making measurements and tests such as might be associated with manufacturing processes and quality-control procedures.

The accuracy of the equipment has not been investigated.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 3101-1, "Electrical and Measuring Test Equipment: Part 1: General Requirements".

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Inspection Equipment for Use in Hazardous Locations" or "Measuring Equipment for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**INSPECTION AND MEASURING
ELECTRICAL EQUIPMENT, SPECIAL
INSPECTION EQUIPMENT (NYQD)**

GENERAL

This category covers portable, mobile, stationary, and fixed units or systems intended primarily for the purpose of identifying materials, examining and investigating materials, including x-ray scanning (luggage) units, and other equipment that uses special technologies to perform its function.

Equipment not covered under this category includes, but is not limited to, medical x-ray equipment (including x-ray equipment designed to operate on supply potentials of over 600 V), equipment incorporating unenclosed aerial conductors, separate devices, such as tables, timers, etc., that are not limited in design to x-ray applications, and equipment which is not necessary for successful operation of x-ray equipment. See Inspection and Measuring Electrical Equipment (NYOK) and Medical Equipment (PIDF).

This equipment has been Classified as to electrical fire, shock, and mechanical hazards only.

The individual units of a system may be designed to be interconnected by means of one or more of the wiring methods outlined in ANSI/NFPA 70, "National Electrical Code."

The nature of some of this equipment is such that it involves features of installation and use not ordinarily presented in utilization equipment. Such features are covered in the manufacturer's installation instructions. Installation must, if possible, be made in a room or compartment in which provision is made to prevent fire or injury to persons and must, in all cases, be in accordance with the manufacturer's installation instructions furnished with the equipment and the requirements of the Authorities Having Jurisdiction.

FACTORS NOT INVESTIGATED

These products generate radiation or contain radioactive materials or involve working with toxic materials, or other potentially harmful technologies, where data regarding levels of exposure and physiological effects are not investigated. The accuracy of measured, analyzed or prepared quantities has not been investigated.

X-radiation safety and performance requirements are regulated under Public Law 90-602 and are enforced by the U.S. Department of Health, Education and Welfare. Compliance with the applicable regulations under conditions of normal and abnormal operation has not been investigated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 61010A-1, "Electrical Equipment for Laboratory Use: Part 1: General Requirements," or ANSI/UL 61010-1, "Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY*]

**WITH RESPECT TO ELECTRICAL FIRE, SHOCK AND MECHANICAL
HAZARDS ONLY**

Control No.

*** SPECIAL INSPECTION EQUIPMENT or SPECIAL MEASURING
EQUIPMENT, or the name of the specific type of product**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PRODUCT CATEGORIES BY CATEGORY CODE

INSTRUMENTATION TRAY CABLE (NYTT)

GENERAL

This category covers Type ITC instrumentation tray cable for use only in industrial establishments in accordance with Article 727 of ANSI/NFPA 70, "National Electrical Code" (NEC). The cable consists of two or more insulated copper or thermocouple alloy conductors enclosed within a nonmetallic jacket. The cable may have a metal sheath or armor over the nonmetallic jacket, and may contain grounding conductors and/or optical fiber members.

The cable is rated 300 V and is intended for use on circuits rated 150 V or less and 5 A or less. The cable is certified in conductor sizes 22 to 12 AWG. Conductor sizes within a cable may be mixed.

Regarding cable seals outlined in Article 501 of the NEC, Type ITC cable has a sheath considered to be gas/vapor tight but the cable has not been investigated for inability to transmit gases through its core.

PRODUCT MARKINGS

The cable identification "TYPE ITC" and other markings are visible on the surface of the nonmetallic jacket.

Cable with thermocouple alloy conductors is intended for thermocouple extension use only and is so marked or has the marking "THCPL EXTN."

The temperature rating of the cable is 60°C unless otherwise marked on the cable.

Cable containing optical fiber members is identified with the suffix "OF."

Cable investigated in accordance with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is marked with the suffix "-LS."

Cable investigated for direct burial in the earth is marked "DIRECT BURIAL" (or "DIR BUR").

Cable permitted to be used between cable trays and utilization equipment in accordance with Section 727.4(5) of the NEC is surface marked with the supplementary letters "-ER" (formerly marked "Open Wiring").

Cable marked "Wet" or "Wet Location" is suitable for use in wet locations.

Cable for use in hazardous (classified) locations, Class I, Division 1, Groups A, B, C and D, and Class I, Zone 1, Groups IIA, IIB and IIC in accordance with the NEC is marked "Type ITC-HL."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2250, "Instrumentation Tray Cable."

The basic standard used to investigate cable marked "Type ITC-HL" in this category is ANSI/UL 2225, "Cables and Cable Fittings for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Instrumentation Tray Cable, Type ITC."

See Cable for Use in Hazardous Locations (PIPP) for Certification Mark requirements for "Type ITC-HL."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

INSULATING DEVICES AND MATERIALS (NYYV)

INSULATING BUSHINGS (NZMT)

USE

This category covers insulating bushings intended for the protection of wire, cable and flexible cord where it passes through walls or barriers of metal.

RELATED PRODUCTS

Insulating bushings intended for use on the ends of conduit in boxes, gutters, etc. are covered under Conduit Fittings (DWTI).

Insulating bushings intended for use on the ends of rigid or flexible conduit, electrical metallic tubing, or armored cable, where a change to open wiring is made, are covered under Outlet Bushings and Fittings (QCRV).

Insulating Bushings (NZMT)—Continued

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 635, "Insulating Bushings."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Bushings" or "Insulated Bushing."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

INSULATING TAPE (OANZ)

USE

This category covers rubber insulating tape for insulating joints and splices in electrical conductors where an outer covering of protective material, such as friction tape, is intended to be applied over the insulating tape.

This category also covers thermoplastic tape intended for use as the sole insulation and covering of joints and splices in electrical conductors.

This tape is suitable as electrical insulation at not more than 600 V and at temperatures not exceeding 80°C (176°F).

PRODUCT MARKINGS

The wrapper or carton containing a single roll of tape, or the central paper core on which the tape is wrapped, is marked with (1) the manufacturer's name or trademark, (2) the catalog or type number, and (3) the words "For use at not more than 600 V and at not more than 80°C (176°F)," or an equivalent statement.

Tape determined to be flame retardant is marked "Flame Retardant."

Tape determined to be suitable for exposure to sunlight is marked "Sunlight Resistant."

Tape determined to be suitable to insulate splices while subjected to temperatures down to -10°C is marked "Cold Resistant."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 510, "Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Insulating Tape" (or "Insul. Tape"), "Electrical Tape" (or "Elec. Tape") or "Electrical Insulating Tape" (or "Elect. Insul. Tape"), or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

INSULATING DEVICES AND MATERIALS, MISCELLANEOUS (OCDT)

GENERAL

This category covers miscellaneous insulating devices and materials, such as insulating caps, closures, covers and links.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 746A, "Polymeric Materials - Short Term Property Evaluations," ANSI/UL 746B, "Polymeric Materials - Long Term Property Evaluations," and ANSI/UL 746C, "Polymeric Materials - Use in Electrical Equipment Evaluations."

UL MARK

Insulating Devices and Materials, Miscellaneous (OCDT)—Continued

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Insulating Link," "Insulating Cover" or "Insulating Closure," or other appropriate product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

INTERCOMMUNICATION SYSTEMS FOR USE IN HAZARDOUS LOCATIONS, MARINE (ODJV)

TELEPHONES FOR USE IN HAZARDOUS LOCATIONS, MARINE (OEPX)

GENERAL

This category covers telephone sets with a handset-type transmitter and receiver, and sound-powered telephone handsets for installation with circuit wiring, except cord assembly, using wiring materials specified by the Electrical Engineering Regulations of Subchapter J, Title 46, Code of Federal Regulations, Parts 110 to 113 inclusive. The sound-powered telephones are intrinsically safe and should not be installed with any other equipment or wiring that may impart dangerous currents to them.

These telephones are intended for use on ocean-going vessels and are designed to operate without causing ignition of surrounding flammable gas or vapor-air atmospheres covered by the Class I, Divisions 1 and 2 hazardous locations groups under which they are certified. Telephones certified for use in any of the groups under Class II, Divisions 1 and 2 hazardous locations have been tested for dust-tightness and safe operation in the presence of the specific combustible dusts.

This category also covers telephones for use in Division 2 only of one or more of the hazardous locations groups. Such telephones are similar to those for Division 1 locations except that ordinary handsets are provided that do not have any switches or arcing parts. These telephones are marked with the words "Division 2 Only."

The handset and cord assembly should be carefully inspected and should be replaced if there is any evidence of damage or deterioration or corrosion.

Station equipment, power supply equipment, and protectors, when used with these telephones, should be located outside the hazardous area. Information with regard to telephone supply line protection is given in the individual certifications.

ADDITIONAL INFORMATION

For additional information, see Marine Products (AAMP) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Marine Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Marine Listing Mark for these products includes the UL symbol with the word "MARINE" above the UL symbol (as illustrated in the Introduction of this Directory), the word "LISTED," a control number, and the product name "Telephone for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EQUIPMENT AND SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (OERX)

GENERAL

This category covers products and systems investigated for use in hazardous (classified) locations. Included are intrinsically safe products, intrinsically safe systems, associated apparatus with intrinsically safe circuit extensions, and other arrangements involving intrinsic safety as identified in the individual certifications, together with nonincendive types of protection.

This equipment has not been investigated for performance of its intended function.

RELATED PRODUCTS

Gas detectors investigated for their performance relative to their ability to detect gas are covered under Gas and Vapor Detection Equipment Listed for Use in Hazardous Locations (JTPX).

Equipment investigated for use only in the hazardous locations of automotive and marine service stations is covered under Control, Monitoring and Auxiliary Equipment (EQXX).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are ANSI/UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations," and ANSI/ISA-12.12.01, "Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT NAME] FOR USE IN HAZARDOUS LOCATIONS ONLY AS TO INTRINSIC SAFETY
Control No.

or

[PRODUCT NAME] FOR USE IN HAZARDOUS LOCATIONS AS TO FIRE, ELECTRICAL SHOCK AND EXPLOSION HAZARDS ONLY
Control No.

The words "HAZARDOUS LOCATIONS" may be abbreviated "HAZ. LOC."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ION GENERATORS (OETX)

GENERAL

This category covers portable air ionizers of the household and commercial types intended for emitting charged ions into the atmosphere. These appliances may or may not employ mechanical filters.

REBUILT PRODUCTS

This category also covers ion generators that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt ion generators are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt ion generators are subject to the same requirements as new ion generators.

FACTORS NOT INVESTIGATED

The physiological effects of the operation of these appliances, beneficial or otherwise, have not been investigated.

RELATED PRODUCTS

Electrostatic air cleaners and fans employing electrostatic air cleaners are covered under Electrostatic Air Cleaners (AGGZ).

Air-filtering appliances utilizing mechanical filtration only or ultraviolet/germicidal lamps are covered under Air-filtering Appliances (AEDX).

Deodorizers intended to be used in treating air by dispersal of chemicals or by scenting the air are covered under Deodorizers and Air Fresheners (EOGX).

PRODUCT CATEGORIES BY CATEGORY CODE

Deodorizers intended to remove odors in specific applications by ozone generation are covered under Deodorizers, Ozone-generator Type (EOKL).

Appliances employing ultraviolet lamps or ionization tubes for the purpose of treating air and having provisions for connection to heating and ventilation ducts used for air distribution are covered under Accessories, Air Duct Mounted (ABQK).

Power supplies intended for use in electrostatic air-cleaning equipment are covered under Power Supplies, Electrostatic Air-cleaning Equipment (QQCH2).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 867, "Electrostatic Air Cleaners."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ion Generator," or other appropriate product name as shown in the individual Listings.

For rebuilt products, the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

INTRINSICALLY SAFE EQUIPMENT AND SYSTEMS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (OEVX)

GENERAL

This category covers products and systems investigated as to intrinsic safety only, as it pertains to use in hazardous (classified) locations. Included are intrinsically safe products, intrinsically safe systems, associated apparatus with intrinsically safe circuit extensions, and other arrangements involving intrinsic safety as identified in the individual certifications.

This equipment has not been investigated for performance of its intended function.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are ANSI/UL 60079-0, "Electrical Apparatus for Explosive Gas Atmospheres – Part 0: General Requirements," and ANSI/UL 60079-11, "Electrical Apparatus for Explosive Gas Atmospheres – Part 11: Intrinsic Safety 'i'."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**[PRODUCT IDENTITY] FOR USE IN HAZARDOUS LOCATIONS
ONLY AS TO INTRINSIC SAFETY
Control No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

IRRIGATION CABLE (OFFY)

GENERAL

This category covers irrigation cable for use with electrically driven or controlled irrigation machines in accordance with Article 675 of ANSI/NFPA 70, "National Electrical Code."

Irrigation cable used to interconnect enclosures on the structure of an irrigation machine is an assembly of stranded, insulated conductors with non-

hygroscopic fillers in a core of moisture and flame resistant, nonmetallic material overlaid with a metallic covering and jacketed with a moisture, corrosion and sunlight-resistant nonmetallic material. Irrigation cable is suitable for direct burial in the earth and may, optionally, be so marked.

This cable may consist of a composite of power, control and grounding conductors in sizes 18 AWG and larger, stranded copper, and is rated 75°C and 600 V.

RELATED PRODUCTS

Fittings for use with this cable are covered under Outlet Bushings and Fittings (QCRV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1263, "Outline of Investigation for Irrigation Cables."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, coil, reel, or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Irrigation Cables."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

IRRIGATION CABLE ASSEMBLIES (OFJZ)

USE

This category covers irrigation cable assemblies consisting of certified irrigation cable terminated at each end in special-purpose fittings, intended for use with irrigation equipment in accordance with Article 675 of ANSI/NFPA 70, "National Electrical Code" (NEC). These assemblies are connecting devices used to interconnect multiple parts of irrigation equipment as permitted by the NEC.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Irrigation Cable Assembly."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LABORATORY EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (OGNA)

GENERAL

This category covers laboratory equipment and accessories designed for technological activities involving:

1. The measurement of physical or chemical properties of materials.
2. The measurement, control, and/or display of the functional performance of a piece of equipment.
3. Qualitative or quantitative constituent analysis of substances.
4. Preparation of materials for further analysis or measurements.

These products have been investigated with respect to risk of fire, shock, and injury to persons. The accuracy of measured, analyzed, or prepared quantities has not been investigated.

This category does not cover laboratory equipment intended for patient contact.

In cases where the nature or construction of the equipment is such that special precautions beyond the requirements of ANSI/NFPA 70, "National Electrical Code," must be observed in installation or use, the necessary instructions are marked on the equipment or provided in the instructions.

RELATED PRODUCTS

Other equipment that may be used in laboratories is covered under Heaters, Industrial and Laboratory for Use in Hazardous Locations (KGIZ).

LABORATORY EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (OGNA)
ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 61010A-1, "Electrical Equipment for Laboratory Use; Part 1: General Requirements."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Motor-operated Laboratory Equipment for Use in Hazardous Locations" or "Laboratory Equipment for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LABORATORY HOODS AND CABINETS (OGOY)

USE AND INSTALLATION

This category covers laboratory hoods, biological safety cabinets and laminar flow cabinets classified as to fire, electrical and mechanical hazards.

Laboratory hoods are intended to provide an enclosed counter top work area with exhaust for capture and removal of vapors, mists and particulate matter from the work area.

Biological safety cabinets are intended to provide an enclosed counter top work area for handling and containment of biological materials.

Laminar flow cabinets are ventilated, partially enclosed cabinets using laminar air flow and intended to provide "clean" air flow over the work surface.

These products have been investigated for fire, electrical and mechanical hazards only. Effectiveness and reliability of air flow for capture, containment and exhaust have not been investigated. Unless specifically marked on the equipment, suitability for use with perchloric acid, radiological materials, or the like has not been investigated.

Requirements for the installation of this equipment are included in NFPA 45-1982, "Fire Protection for Laboratories Using Chemicals."

PRODUCT MARKINGS

Laboratory hoods and cabinets are marked with (1) the manufacturer's name, trade name or trademark or other descriptive marking by which the organization responsible for the product may be identified, (2) a distinctive "catalog" or "model" number or the equivalent, (3) the electrical rating, and (4) the date or other dating period of manufacture not exceeding any three consecutive months.

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1805, "Laboratory Hoods and Cabinets."

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY]
IN ACCORDANCE WITH UL 1805
Control No.

or

[PRODUCT IDENTITY]
AS TO FIRE, ELECTRICAL AND MECHANICAL HAZARDS ONLY
Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

LABORATORY HOODS AND CABINETS (OGOY)

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any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LABORATORY-USE ELECTRICAL EQUIPMENT (OGTK)

USE

This category covers laboratory equipment used to measure, indicate, monitor or analyze substances, or to prepare materials, including in vitro diagnostic (IVD) equipment. Examples include but are not limited to blood/tissue/gas analyzers, centrifuges, hot plates and stirrers, sterilizers, fiber-optic illuminators and laboratory mixers.

MODULAR SYSTEMS

Laboratory equipment may be shipped completely assembled or in modular form. Modular assemblies are intended to be field assembled to form a complete system in accordance with the provided installation instructions.

ACCESSORIES AND SUBASSEMBLIES

Field-installed accessories and subassemblies (component assemblies) to Listed equipment are provided with suitable markings and/or instructions, providing details on proper installation or assembly of the accessory/subassembly with equipment specified in the markings or instructions.

REBUILT PRODUCTS

This category also covers laboratory equipment that is rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt laboratory equipment is factory rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt laboratory equipment is subject to the same requirements as new laboratory equipment.

UNEVALUATED FACTORS

These products have been investigated with respect to risk of fire, shock and injury to persons. Where such equipment is included in systems that involve other pieces of equipment or mechanical operations, the investigation of the risk of fire, electric shock and personal injury has included only the equipment specifically Listed in the individual Listings. The accuracy of measured, analyzed or prepared quantities has not been investigated.

RELATED PRODUCTS

Laboratory equipment intended for patient contact is covered under Medical Equipment (PIDF).

Additional equipment that may be used in laboratories is covered under Heaters, Industrial and Laboratory (KQLR) and Measuring, Testing and Signal Generation Equipment (PICQ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 61010-1, "Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements," and one or more of the following Particular Standards as applicable:

IEC 61010-2-010, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-010: Particular Requirements for Laboratory Equipment for the Heating of Materials"
IEC 61010-2-020, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-020: Particular Requirements for Laboratory Centrifuges"
IEC 61010-2-040, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-040: Particular Requirements for Sterilizers and Washer-Disinfectors Used to Treat Medical Materials"

IEC 61010-2-051, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-051: Particular Requirements for Laboratory Equipment for Mixing and Stirring"

IEC 61010-2-061, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-061: Particular Requirements for Laboratory Atomic Spectrometers with Thermal Atomization and Ionization"

IEC 61010-2-081, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-081: Particular Requirements for Automatic and Semi-Automatic Laboratory Equipment for Analysis and Other Purposes"

IEC 61010-2-101, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-101: Particular Requirements for In Vitro Diagnostic (IVD) Medical Equipment"

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up

Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Laboratory Equipment," or other appropriate product name as shown in the individual Listings.

When the size or shape of a subassembly makes it impractical to incorporate the product identification text, the product may be marked with the UL symbol, "OGTK" and the control number, provided that the complete Listing Mark text appears on the smallest shipping container.

For field-installed modules, accessories and subassemblies, the product name includes the word "Module," "Accessory" or "Subassembly" (e.g., "Laboratory Equipment Accessory").

For rebuilt equipment, the word "Rebuilt," "Remanufactured," "Refurbished" (or "Refurb") or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LABORATORY ELECTRICAL EQUIPMENT FOR USE IN HEALTH CARE APPLICATIONS (OGUI)

USE

This category covers laboratory equipment for health care applications, used to measure, indicate, monitor or analyze substances, or to prepare materials. Examples include but are not limited to centrifuges, hot plates and stirrers, sterilizers, fiber-optic illuminators and laboratory mixers.

MODULAR SYSTEMS

Laboratory equipment may be shipped completely assembled or in modular form. Modular assemblies are intended to be field assembled to form a complete system in accordance with the provided installation instructions.

ACCESSORIES AND SUBASSEMBLIES

Field-installed accessories and subassemblies (component assemblies) to Listed equipment are provided with suitable markings and/or instructions, providing details on proper installation or assembly of the accessory/subassembly with equipment specified in the markings or instructions.

REBUILT PRODUCTS

This category also covers laboratory equipment that is rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt laboratory equipment is factory rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt laboratory equipment is subject to the same requirements as new laboratory equipment.

UNEVALUATED FACTORS

These products have been investigated with respect to risk of fire, shock and injury to persons. Where such equipment is included in systems that involve other pieces of equipment or mechanical operations, the investigation of the risk of fire, electric shock and personal injury has included only the equipment specifically Listed in the individual Listings. The accuracy of measured, analyzed or prepared quantities has not been investigated.

RELATED PRODUCTS

Laboratory equipment intended for patient contact is covered under Medical Equipment (PIDF).

Additional equipment that may be used in laboratories is covered under Heaters, Industrial and Laboratory (KQLR), Measuring, Testing and Signal Generation Equipment (PICQ) and Laboratory Use Electrical Equipment (OGTK).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 61010A-1, "Electrical Equipment for Laboratory Use – Part 1: General Requirements," or ANSI/UL 61010-1, "Electrical Equipment for Measurement, Control and Laboratory Use – Part 1: General Requirements," and one or more of the following Particular Standards as applicable:

IEC 61010-2-010, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-010: Particular Requirements for Laboratory Equipment for the Heating of Materials"

IEC 61010-2-020, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-020: Particular Requirements for Laboratory Centrifuges"

IEC 61010-2-041, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-041: Particular Requirements for Autoclaves Using Steam for the Treatment of Medical Materials, and for Laboratory Processes"

IEC 61010-2-042, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-042: Particular Requirements for Autoclaves and Sterilizers Using Toxic Gas for the

Laboratory Electrical Equipment for Use in Health Care Applications (OGUI)–Continued

Treatment of Medical Materials, and for Laboratory Processes"

IEC 61010-2-043, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-043: Particular Requirements for Dry Heat Sterilizers Using Either Hot Air or Hot Inert Gas for the Treatment of Medical Materials, and for Laboratory Processes"

IEC 61010-2-045, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-045: Particular Requirements for Washer Disinfectors Used in Medical, Pharmaceutical, Veterinary and Laboratory Fields"

IEC 61010-2-051, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-051: Particular Requirements for Laboratory Equipment for Mixing and Stirring"

IEC 61010-2-061, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-061: Particular Requirements for Laboratory Atomic Spectrometers with Thermal Atomization and Ionization"

IEC 61010-2-081, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-081: Particular Requirements for Automatic and Semi-Automatic Laboratory Equipment for Analysis and Other Purposes"

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Laboratory Electrical Equipment for Use in Health Care Applications," or other appropriate product name as shown in the individual Listings.

When the size or shape of a subassembly makes it impractical to incorporate the product identification text, the product may be marked with the UL symbol, "OGUI" and the control number, provided that the complete Listing Mark text appears on the smallest shipping container.

For field-installed modules, accessories and subassemblies, the product name includes the word "Module," "Accessory" or "Subassembly" (e.g., "Laboratory Equipment Accessory").

For rebuilt equipment, the word "Rebuilt," "Remanufactured," "Refurbished" (or "Refurb") or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LABORATORY-USE ELECTRICAL EQUIPMENT, SPECIAL LABORATORY EQUIPMENT (OGVH)

GENERAL

This category covers laboratory equipment that uses special technologies to measure, indicate, monitor or analyze substances, or to prepare materials, or to sterilize materials or areas, and other laboratory equipment that uses special technologies to perform its function. Examples include but are not limited to room sterilizers, equipment sterilizers, disinfection equipment, laboratory air cleaners, and decontamination equipment.

This equipment has been Classified as to electrical fire, shock and mechanical hazards only.

The individual units of a system may be designed to be interconnected by means of one or more of the wiring methods outlined in ANSI/NFPA 70, "National Electrical Code."

The nature of some of this equipment is such that it involves features of installation and use not ordinarily presented in utilization equipment. Such features are covered in the manufacturer's installation instructions. Installation should, if possible, be made in a room or compartment in which provision is made to prevent fire or injury to persons, and should also be in accordance with the manufacturer's installation instructions furnished with the equipment and the requirements of the Authorities Having Jurisdiction.

MODULAR SYSTEMS

Special laboratory equipment may be shipped completely assembled or in modular form. Modular assemblies are intended to be field assembled to form a complete system in accordance with the provided installation instructions.

ACCESSORIES AND SUBASSEMBLIES

Field-installed accessories and subassemblies (component assemblies) to Classified equipment are provided with suitable markings and/or instructions, providing details on proper installation or assembly of the accessory/subassembly with equipment specified in the markings or instructions.

UNEVALUATED FACTORS

These products have been investigated with respect to risk of fire, shock and injury to persons. Where such equipment is included in systems that involve other pieces of equipment or mechanical operations, the investigation of the risk of fire, electric shock and personal injury has included only the equipment specifically Classified in the individual Classifications. The accuracy of measured, analyzed or prepared quantities has not been investigated.

RELATED PRODUCTS

Laboratory equipment intended for patient contact is covered under Medical Equipment (PIDF).
Additional equipment that may be used in laboratories is covered under:
Heaters, Industrial and Laboratory (KQLR)
Laboratory Electrical Equipment for Use in Health Care Applications (OGU)
Laboratory In Vitro Diagnostic Electrical Equipment (OGUR)
Laboratory-use Electrical Equipment (OGTK)
Measuring, Testing and Signal-generation Equipment (PICQ)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 61010-1, "Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT NAME*]

AS TO ELECTRICAL FIRE, SHOCK AND MECHANICAL HAZARDS ONLY

Control No.

* **LABORATORY DISINFECTING EQUIPMENT, ROOM DECONTAMINATION EQUIPMENT, ROOM SANITIZER,** or other appropriate product name as shown in the individual Classifications

For field-installed modules, accessories and subassemblies, the product name includes the word "MODULE," "ACCESSORY" or "SUBASSEMBLY" (e.g., "ROOM SANITIZER ACCESSORY").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LAMPOLDERS (OIMZ)

LAMPOLDERS, ELECTRIC DISCHARGE (OJAX)

Lampholders, Electric Discharge, Over 1000 Volts (OJOV)

USE

This category covers lampholders and electrode receptacles for use with electric discharge lamps and tubes.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 496, "Lampholders," and ANSI/UL 879, "Electric Sign Components."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Lampholder" or "Electric Discharge Lampholder," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Lampholders, Electric Discharge, Over 1000 Volts (OJOV)–Continued

Manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Lampholders, Electric Discharge, 1000 Volts or Less (OKCT)

USE

This category covers lampholders and combination lampholders with starter holders intended for use with electric discharge or fluorescent lamps.

This category also covers GU24 and GU24-1 holders for fluorescent and LED self-ballasted lamps and lamp adapters with mating pin bases.

Lampholders for High Temperature — Thermoplastic lampholders investigated for use at temperatures greater than 90°C (194°F) are indicated in the individual certifications. These products are marked with "T#" (where "#" is the temperature rating).

RELATED PRODUCTS

Separate starter holders are covered under Holders for Automatic Starters (FLPZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 496, "Lampholders."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Lampholder" or "Electric Discharge Lampholder," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LAMPOLDERS, FITTINGS (OKQR)

USE

This category covers attachments and parts that modify lampholders for certain conditions of usage.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 496, "Lampholders."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Lampholder Fitting" or "Shadeholder," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LAMPOLDERS, INCANDESCENT (OLDZ)

Lampholders, Adapters (OLRX)

GENERAL

This category covers screw-shell lamp adapters. Included are male-to-female screw-shell adapters and screw-shell adapters provided with attachment-plug blades or receptacles.

PRODUCT CATEGORIES BY CATEGORY CODE

Lampholders, Adapters (OLRX)—Continued

RELATED PRODUCTS

For plug-in devices with a lampholder intended to be used as a nightlight, see Nightlights (QOYX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 496, "Lampholders."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Adapter," "Lampholder Adapter" or "Incandescent Lampholder Adapter," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Lampholders, Candelabra and Miniature (OMFV)

GENERAL

This category covers screw-shell lampholders of the candelabra (E12) and miniature (E10) base sizes.

Candle lampholders are those having exposed wiring terminals or other live parts intended for use with a close fitting, nonmetallic outer decorative casing, which is used in addition to the paper covering on the screw shell and terminals, to enclose the entire lampholder and provide the required depth of lamp cavity.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 496, "Lampholders."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Lampholder," "Miniature Lampholder" or "Candelabra Lampholder."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Lampholders, Intermediate Base (OMTT)

GENERAL

This category covers screw-shell lampholders of the intermediate (E17) base size.

Candle lampholders are those having exposed wiring terminals or other live parts intended for use with a close fitting, nonmetallic outer decorative casing, which is used, in addition to the paper covering on the screw shell and terminals, to enclose the entire lampholder and provide the required depth of lamp cavity.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 496, "Lampholders."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Lampholder," "Intermediate Lampholder" or "Incandescent Lampholder."

Lampholders, Intermediate Base (OMTT)—Continued

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Lampholders, Medium Base (ONHR)

GENERAL

This category covers screw-shell lampholders of the admedium (E29) and medium (E26) base sizes.

Candle lampholders are those having exposed wiring terminals or other live parts intended for use with a close fitting, nonmetallic outer decorative casing, which is used, in addition to the paper covering on the screw shell and terminals, to enclose the entire lampholder and provide the required depth of lamp cavity.

Admedium (E29) bases are not intended for use with ordinary incandescent lamps.

Switched lampholders are tested on circuits involving a potential to ground of 125 V.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 496, "Lampholders."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Lampholder," "Medium Lampholder" or "Incandescent Lampholder."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Lampholders, Mogul Base (ONUZ)

GENERAL

This category covers screw-shell lampholders of the mogul (E39) base size. Switched lampholders are tested on circuits involving a potential to ground of 125 V.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 496, "Lampholders."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Lampholder," "Mogul Lampholder" or "Incandescent Lampholder."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Lampholders, Miscellaneous (OOIX)

GENERAL

This category covers lampholders for lamps that employ other than the usual screw-shell bases or designed for specialized uses.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Lamp holders, Miscellaneous (OOIX)—Continued

The basic standard used to investigate products in this category is ANSI/UL 496, "Lamp holders."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Lamp holder," "Miscellaneous Lamp holder" or "Incandescent Lamp holder."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LAMPS (OOKH)**LAMPS, SELF-BALLASTED AND LAMP ADAPTERS (OOLR)****USE AND INSTALLATION**

This category covers self-ballasted lamps consisting of a ballast, transformer or power supply, and an integrated or replaceable lamp, for direct connection to a lampholder. Products in this category employ various lamp technologies including, but not limited to, fluorescent lamps and high-intensity-discharge (HID) lamps. Devices with an integral lamp are termed "self-ballasted"; devices with a replaceable lamp are termed "adapters." These products are intended for operation at the voltage marked on the product.

This category also covers fluorescent lamp adapters intended as direct substitutes for specific fluorescent lamps (e.g., F40T12RS), and designed to operate a more energy-efficient fluorescent lamp directly from the existing ballast without modifying the luminaire (e.g., T12 to T5 lamp adapters).

This category does not cover:

- Self-ballasted lamps and lamp adapters rated 50 W or greater for installation in specific luminaires
- LED lamps

These products are intended for connection to lampholders for outlet boxes and lampholders provided in luminaires, portable luminaires and signs. They are provided with ANSI lamp bases. ANSI base configurations are covered in standards such as NEMA_ANSLG C81.61, "Electrical Lamp Bases - Specifications for Bases (Caps) for Electric Lamps." When differentiating between low-voltage and line-voltage ANSI lamp bases, consideration is given to Tables 7.3.3.1 and 7.3.3.2 in ANSI/UL 1598, "Luminaires."

These products are generally for use in indoor, dry locations unless additionally investigated and marked for applications such as damp locations (not directly exposed to water). Products investigated and marked for wet locations may have additional restrictions regarding use or orientation.

These products have been investigated for use in the smaller of a 6- or 8-in. diameter, totally enclosed, recessed luminaire, if they will physically fit, unless marked not for use in a totally enclosed luminaire.

These products have not been investigated for use in emergency lighting equipment or exit signs.

RELATED PRODUCTS

Self-ballasted lamps and lamp adapters rated 50 W or greater for installation in specific luminaires are covered under Lamps, Self-ballasted and Lamp Adapters (OOLR2).

Self-ballasted light-emitting-diode (LED) lamps are covered under Lamps, Self-ballasted, Light-emitting-diode Type (OOLV).

LED lamps intended for specific luminaires or special applications are covered under Lamps, Self-ballasted, Light-emitting-diode Type (OOLV2).

User-replaceable solid-state (LED) light engines are covered under Solid-state Light Engines (OORA).

Solid-state (LED) light engines not intended for user replacement, or intended for specific luminaires or special applications are covered under Solid-state Light Engines (OORA2).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1993, "Self-Ballasted Lamps and Lamp Adapters."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the prod-

Lamps, Self-ballasted and Lamp Adapters (OOLR)—Continued

uct is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Self-ballasted Lamp" or "Lamp Adapter," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LAMPS, SELF-BALLASTED, LIGHT-EMITTING-DIODE TYPE (OOLV)**USE AND INSTALLATION**

This category covers self-ballasted light-emitting-diode (LED) lamps, rated up to 277 V ac nominal, provided with ANSI lamp bases.

Self-ballasted lamps have integral control and driver circuitry allowing direct connection to a voltage source (e.g., mains, transformer) without the use of an external constant-current source such as a driver or ballast. Such lamps are intended for operation at their marked voltage(s).

This category also covers lamps intended as direct substitutes for specific fluorescent lamps, and designed to operate directly from the existing fluorescent ballast without modifying the luminaire.

These products are intended for connection to lampholders for outlet boxes and lampholders provided in luminaires, portable luminaires and signs. They are provided with ANSI lamp bases. ANSI base configurations are covered in standards such as NEMA_ANSLG C81.61, "Electrical Lamp Bases - Specifications for Bases (Caps) for Electric Lamps." When differentiating between low-voltage and line-voltage ANSI lamp bases, consideration is given to Tables 7.3.3.1 and 7.3.3.2 in ANSI/UL 1598, "Luminaires."

These products are generally for use in indoor, dry locations unless additionally investigated and marked for applications such as damp locations (not directly exposed to water). Products investigated and marked for wet locations may have additional restrictions regarding use or orientation.

LED lamps intended to replace or supplant traditional incandescent lamps have been investigated for use in the smaller of a 6 in. (150 mm) or 8 in. (200 mm) diameter, totally enclosed, recessed luminaire, if they will physically fit, unless marked not for use in a totally enclosed luminaire.

LED lamps intended to replace or supplant traditional fluorescent lamps have been investigated for use in totally enclosed lamp compartments with 1 in. (25.4 mm) of clearance around the sides and underneath the lamp, unless marked not for use in a totally enclosed luminaire.

Products marked "Suitable for Use in Open Luminaires" are intended to replace tungsten-halogen lamps in applications where the luminaire is open and does not require an additional lamp containment barrier.

These products have not been investigated for use in emergency lighting equipment or exit signs.

RELATED PRODUCTS

LED lamps intended for connection to constant-current power sources (e.g., LED drivers), or those intended for specific luminaires or special applications are covered under Lamps, Self-ballasted, Light-emitting-diode Type (OOLV2).

User-replaceable solid-state (LED) light engines are covered under Solid-state Light Engines (OORA).

Solid-state (LED) light engines not intended for user replacement, or intended for specific luminaires or special applications are covered under Solid-state Light Engines (OORA2).

LED retrofit kits intended for field installation in UL Listed luminaires or office-furnishing lights are covered under Light-emitting-diode Retrofit Luminaire Conversion Kits (IFAR).

Self-ballasted fluorescent and high-intensity-discharge (HID) lamps and lamp adapters are covered under Lamps, Self-ballasted and Lamp Adapters (OOLR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1993, "Self-Ballasted Lamps and Lamp Adapters," and ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduc-

Lamps, Self-ballasted, Light-emitting-diode Type (OOLV)—Continued

tion of this Directory) together with the word "LISTED," a control number, and the product name "LED Lamp," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LAMPS, SPECIALTY (OONB)

USE

This category covers specialty lamps, usually of the common bulb shapes, containing assemblies of light sources (such as miniature incandescent bulbs, light-emitting diodes) and associated electrical components, and provided with bases of various sizes, usually of the standard configurations covered in ANSI/ANSI C81.61, "American National Standard for Electrical Lamp Bases - Specifications for Bases (Caps) for Electric Lamps."

These lamps are intended for use in certified equipment, such as exit fixtures or exit lights, where the product marking specifies the use of a lamp covered under this category.

PRODUCT MARKINGS

The lamp or the smallest unit container is marked with the wattage, voltage, manufacturer's identification and catalog number.

FACTORS NOT INVESTIGATED

Interchangeability of these lamps with commonly available lamps has not been investigated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 496, "Lampholders."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

SPECIALTY LAMP

FOR USE IN PRODUCTS MARKED

TO USE UL CLASSIFIED LAMP, ____ (+) ____ (++)

Control No.

(+) Company identification

(++) Lamp catalog number

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LAMPS, TUNGSTEN HALOGEN (OOOJ)

GENERAL

This category covers tungsten halogen lamps employing an integral shield that has only been investigated in accordance with the guard and shield requirements applicable to lighting products for use with tungsten halogen lamps.

These lamps may be used in all certified lighting products with or without a containment barrier where permitted by the product markings.

The lamp or the smallest unit container is marked with the wattage, voltage, lamp type, manufacturer and model number.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 153, "Portable Electric Luminaires."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

TUNGSTEN HALOGEN LAMP

FOR PARTICLE CONTAINMENT ONLY

Control No.

Lamps, Tungsten Halogen (OOOJ)—Continued

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ORGANIC LIGHT-EMITTING-DIODE PANELS (OOQS)

USE

This category covers organic light-emitting-diode (OLED) panels intended for installation directly to a building structure. Unless otherwise marked, they are intended for connection to an isolating power source that limits the voltage to no more than 30 V ac or 60 V dc, and the current to no more than 5 A.

PRODUCT MARKINGS

These panels are marked either for use with a specific power source (manufacturer and model number) or with its electrical input ratings (voltage, frequency, current and wattage).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 8752, "Organic Light Emitting Diode (OLED) Panels."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "OLED Panel."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SOLID-STATE LIGHT ENGINES (OORA)

USE AND INSTALLATION

This category covers user-replaceable, solid-state, light-emitting-diode (LED) light engines, which are solid-state light sources incorporating one or more LED packages or arrays, an LED driver and a mains connection system. They are intended for mains connection through a "defined fit system" of a compatible luminaire rated no more than 277 V to ground.

A "defined fit system" is identified by a marking or a proprietary or industry designation assigned to a light engine interface (i.e., base) and its intended holder to control interchangeability.

These products do not employ ANSI Standard base configurations (e.g., Edison base) that are typically used for incandescent or fluorescent lamps.

These products are generally for use in indoor, dry locations unless additionally investigated and marked for applications such as damp locations (not directly exposed to water). Products investigated and marked for wet locations may have additional restrictions regarding use or orientation.

These products have not been investigated for use in emergency lighting equipment or exit signs.

RATINGS

Solid-state light engines are rated in ac or dc volts, watts and amperes. If intended for ac supplies, they are additionally rated in frequency.

Where suitable for elevated ambient temperatures, solid-state light engines are marked with an ambient temperature rating.

RELATED PRODUCTS

Solid-state (LED) light engines not intended for user replacement, or intended for specific luminaires or special applications are covered under Solid-state Light Engines (OORA2).

Self-ballasted fluorescent or high-intensity-discharge (HID) lamps provided with bases standardized for incandescent and fluorescent luminaires are covered under Lamps, Self-ballasted and Lamp Adapters (OOLR).

Self-ballasted light-emitting-diode (LED) lamps provided with bases standardized for incandescent and fluorescent luminaires are covered under Lamps, Self-ballasted, Light-emitting-diode Type (OOLV).

LED retrofit kits intended for field installation in UL Listed luminaires or office-furnishing lights are covered under Light-emitting-diode Retrofit Luminaire Conversion Kits (IFAR).

LED light sources having provision for field wiring in accordance with ANSI/NFPA 70, "National Electrical Code," are luminaires and covered

LAMPS (OOKH)

Solid-state Light Engines (OORA)–Continued

under Light-emitting-diode Surface-mounted Luminaires (IFAM) or Light-emitting-diode Recessed Luminaires (IFAO).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1993, “Self-Ballasted Lamps and Lamp Adapters,” and ANSI/UL 8750, “Light Emitting Diode (LED) Equipment for Use in Lighting Products.”

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Solid-state Light Engine” or “LED Light Engine.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LEAK-DETECTION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (OPDH)

GENERAL

This category covers leak-detection equipment, including control units, indicators, sensors, probes and auxiliary devices, used as part of leak-detection systems.

Certain products in this category are associated apparatus and are intended for installation in unclassified locations. They are provided with intrinsically safe circuit(s) as indicated on the product, for extension into a hazardous (classified) location.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Leak Detection Equipment for Use in Hazardous Locations” or “Leak Detection Equipment (Associated Apparatus),” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LIGHTING AND POWER EQUIPMENT, AUXILIARY (OUST)

USE AND INSTALLATION

This category covers equipment intended to be used in conjunction with a facility emergency lighting and power system. The equipment may consist of battery assemblies, unit equipment, remote light sources, illuminated signs, or related devices.

This equipment is for use in unclassified locations and is intended for indoor, dry locations only unless marked for damp or wet locations.

This equipment has not been investigated for compliance with the performance criteria of Article 700 of ANSI/NFPA 70, “National Electrical Code,” ANSI/NFPA 101, “Life Safety Code,” or the “Uniform Fire Code.”

LIGHTING AND POWER EQUIPMENT, AUXILIARY (OUST)

RELATED PRODUCTS

See Emergency Lighting and Power Equipment (FTBR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 924, “Emergency Lighting and Power Equipment.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Auxiliary Lighting Equipment” or “Auxiliary Power Equipment.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LIGHTNING PROTECTION (OVGR)

LIGHTNING CONDUCTORS, AIR TERMINALS AND FITTINGS (OVTZ)

GENERAL

This category covers lightning-protection components intended to be installed to provide a lightning-protection system complying with UL 96A, “Installation Requirements for Lightning Protection Systems,” and ANSI/NFPA 780, “Installation of Lightning Protection Systems,” as evidenced by UL’s Master Label® Certificate. These components should be installed using the prescribed manufacturer’s installation instructions.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 96, “Lightning Protection Components.”

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Lightning Conductor,” “Air Terminal” or “Fitting,” or other appropriate product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LIGHTNING PROTECTION SYSTEM INSTALLATIONS (OWAY)

GENERAL

This category covers the installation of lightning protection systems on structures to protect them from damage by lightning. The issuance of a Master Label® Certificate is evidence that the installation of the lightning protection system (1) has been made by an installer that subscribes to UL’s Follow-Up Service, (2) employs materials subject to factory inspection service and bears the UL Mark, and (3) is subject to a field inspection program covering proper installation of the system.

RELATED PRODUCTS

Manufacturers of Listed ground rods suitable for use in installations of lightning protection equipment are covered under Grounding and Bonding Equipment (KDER).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate the lightning protection systems in this category are UL 96A, “Installation Requirements for Lightning Protection Systems,” or ANSI/NFPA 780, “Installation of Lightning Protection Systems,” or IEC 62305-1 (2010), “Protection Against Lightning – Part 1: General Principles,” and IEC 62305-3 (2010), “Protection Against Lightning – Part 3: Physical Damage to Structures and Life Hazard.”

PRODUCT CATEGORIES BY CATEGORY CODE

Lightning Protection System Installations (OWAY)—Continued

Inspection of the surge suppression may be excluded at the request of the installer.

UL CERTIFICATE

The Master Label® Certificate of UL is the only method provided by UL to identify lightning protection systems covered under its Certificate and Follow-Up Service. Installations for which Certificates are issued are considered by UL to be compliant with the applicable requirements at the time of issuance. The Certificate identifies the standard used for the investigation. The Master Label® Certificate is limited to five years from the date of issue and must be renewed to remain in effect.

At the request of the installer, surge protection may be excluded from the scope of the inspection. The Certificate specifically states this exclusion with one of the following statements, as applicable:

“Surge protection was not inspected.”

“The electrical service entrance surge protection system was not inspected.”

“The communication surge protection system was not inspected.”

The above wording is followed by the cautionary statement:

“Surge protection devices are an integral component of a complete lightning protection system and should be provided on all incoming and exiting electric, power, data, and communication services.”

UL maintains a factory inspection service for counterchecking conductors, air terminals and fittings, and also a field inspection service for counterchecking installations.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SURGE-PROTECTIVE DEVICES CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (OWIW)

GENERAL

This category covers surge-protective devices (SPDs) rated 120/240 V maximum, intended to be connected to circuits having an available system short-circuit current of 10 kA maximum and suitable for use as plug-in devices in specified panelboards. The SPDs are certified for use in specified panelboards in accordance with the details on the SPD or in the publication provided with the SPD.

PRODUCT MARKINGS

The SPDs are marked on the side with the statement: “Classified for use only in specified panelboards where the available short-circuit current is 10 kA, 120/240 volts ac or less. Do not use in equipment connected to circuits having an available system short-circuit current in excess of 10 kA, 120/240 volts ac.”

In addition, one of the following statements (or the compatibility list) is marked on the side of the SPD: “For catalog numbers of compatible panelboards, refer to the installation instructions provided with the SPD.” or “For catalog numbers (or equivalent) of specified panelboards, refer to Publication No. ___ provided with this SPD.” The referenced publication is a compatibility list that tabulates the company name, catalog number and electrical ratings of the certified SPD, in addition to the company name and catalog number of the applicable UL-certified panelboards for which the certified SPD has been investigated for use. One copy of the compatibility list is provided with each SPD.

RELATED PRODUCTS

See Surge-protective Devices (VZCA), Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ) and Circuit Breakers, Molded Case, Classified for Use in Specified Equipment (DIXF).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1449, “Surge Protective Devices,” in addition to the requirements contained in Supplement SC of ANSI/UL 67, “Panelboards.”

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

SURGE-PROTECTIVE DEVICES CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (OWIW)

[PRODUCT IDENTITY*]

FOR CATALOG NUMBERS OF COMPATIBLE PANELBOARDS, REFER TO THE INSTALLATION INSTRUCTIONS PROVIDED WITH THE SPD

Control No.

* SURGE-PROTECTIVE DEVICE (or SPD)

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LIMITED COMBUSTIBLE CABLE (OWKZ)

GENERAL

This category covers electrical and optical fiber cable that meets the limited combustible and smoke developed requirements for cable in ceiling cavity and raised floor plenums in accordance with ANSI/NFPA 90A, “Installation of Air Conditioning and Ventilating Systems.” This cable also meets the requirements for cable used in ducts, plenums and other spaces used for environmental air in accordance with Articles 725, 760, 770, 800, 820 and 830 of ANSI/NFPA 70, “National Electrical Code.”

This cable has a maximum Potential Heat value of 3500 Btu/lb when tested in accordance with NFPA 259, “Standard Test Method for Potential Heat of Building Materials.” This cable has a maximum smoke developed index of 50 and a maximum flame spread index of 25 when tested in accordance with ANSI/UL 723 (NFPA 255), “Test for Surface Burning Characteristics of Building Materials,” before and after exposure to elevated temperature and humidity. The cable also meets the requirements for plenum cable in one or more of the following product categories:

- Power-limited Circuit Cable (QPTZ) – Types CL2P or CL3P
- Communications Cable (DUZX) – Type CMP
- Power-limited Fire Alarm Cable (HNIR) – Type FPLP
- Nonpower-limited Fire Alarm Cable (HNHT) – Type NPLFP
- Optical Fiber Cable (QAYK) – Types OFNP or OFCP
- Community Antenna Television Cable (DVCS) – Type CATVP
- Network-powered Broadband Communications Cable (PWIP) – Type BLP

PRODUCT MARKINGS

This cable is identified by the marking “Limited Combustible FHC 25/50” on the surface of the jacket or on a marker tape under the jacket. This marking is immediately followed by one of the Type designations shown above. The cable also has the required markings including optional markings as indicated in the product categories referenced above. This cable may also be Verified for transmission performance if authorized in the product categories referenced above, and will bear the appropriate performance verification marking.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2424, “Outline of Investigation for Cable Marked ‘Limited Combustible.’”

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Limited Combustible Cable.”

Cable which is also Verified to the UL Data Transmission Performance Category Marking Program has the marking “Verified to UL Performance Category Program,” or the UL Verification Mark along with the words “Performance Category Program” together with the Listing Mark information on the tag, the reel, or the smallest unit container. Cable which is also Verified to another transmission performance specification has the marking “Verified in Accordance with [Specification name and/or number]” or the UL Verification Mark along with the applicable Specification name and/or number together with the Listing Mark information on the tag, the reel, or the smallest unit container.

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expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LINE ISOLATION MONITORS (OWLS)

GENERAL

This category covers line isolation monitors, with or without supplementary remote indicating units, designed to supervise the isolated power-supply circuits in hospital inhalation anesthetizing locations.

The monitor and supplementary indicating units are intended to be installed in any of the following locations in conformity with the applicable requirements of ANSI/NFPA 99, "Health Care Facilities Code," and ANSI/NFPA 70, "National Electrical Code":

- (a) Nonhazardous anesthetizing area
- (b) Above a hazardous area (5 ft or more above the floor)
- (c) Included as part of an isolated power-supply center

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1022, "Line Isolation Monitors."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Line Isolation Monitor" or "Line Isolation Monitor Accessory."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LOW-VOLTAGE AC POWER-SWITCHING DEVICES (PAPU)

GENERAL

This category covers devices such as low-voltage ac power circuit breakers, low-voltage dc power circuit breakers, low-voltage ac power circuit protectors, low-voltage ac integrally-fused power circuit breakers, and low-voltage power-switching device adapters.

Low-voltage power-switching devices have been investigated for continuous duty at 100% of their current ratings and are designed to provide service-entrance, feeder or branch-circuit protection. They may be manually and/or electrically operable.

These low-voltage power-switching devices, enclosures and adapters are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings are independent of any marking on terminal connectors and are on a wiring diagram or other readily-visible location.

Stationary equipment is normally bus connected. However, terminal pads are provided which can accommodate field-installed pressure-wire connectors.

PRODUCT MARKINGS AND RATINGS

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60°C wire in circuits rated 100 A or less, and on the use of 75°C wire for higher amp-rated circuits.

Low-voltage power-switching devices suitable for use with an accessory are marked to indicate the accessory(s), the electrical rating and proper connections (if not obvious).

Low-voltage power-switching devices without enclosures are intended for use only in Listed enclosures or as part of other Listed equipment which has been and are marked for use with a specific low-voltage power switching device.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ACCESSORIES, LOW-VOLTAGE POWER-SWITCHING DEVICES (PAQF)

GENERAL

Accessories, Low-voltage Power-switching Devices (PAQF)—Continued

This category covers accessories such as shunt trip devices, undervoltage trip devices, alarm switches and auxiliary switches intended for field installation for use only with specific low-voltage power-switching devices. Correct combinations of low-voltage power-switching devices and accessories are indicated by markings on or with the accessory and/or the low-voltage power-switching device.

ADDITIONAL INFORMATION

For additional information, see Low-voltage AC Power-switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures," ANSI/IEEE C37.13, "Low-Voltage AC Power Circuit Breakers Used in Enclosures," and ANSI/NEMA C37.50, "Switchgear – Low Voltage AC Power Circuit Breakers Used in Enclosures – Test Procedures."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low Voltage Power Breaker Accessory," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ADAPTERS, LOW-VOLTAGE AC POWER-SWITCHING DEVICES (PAQQ)

GENERAL

This category covers equipment designed to adapt low-voltage power-switching devices to receiving devices, such as individual enclosures, dead-front switchboards (switchgear), panelboards, etc. Field installation is intended only in those receiving devices which are specifically marked for their use.

These adapters have been investigated in conjunction with power-switching devices and have been found suitable to carry 100% of the current rating of the power-switching device, and to withstand the maximum fault-current levels specified on the power-switching device.

PRODUCT MARKINGS

The adapters are marked to indicate the power-switching device with which they may be used.

ADDITIONAL INFORMATION

For additional information, see Low-voltage AC Power-switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures," ANSI/NEMA C37.50, "Switchgear – Low Voltage AC Power Circuit Breakers Used in Enclosures – Test Procedures," and ANSI/IEEE C37.20.1, "Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low Voltage Power Switching Device Adapter."

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RETROFIT LOW-VOLTAGE AC POWER-SWITCHING-DEVICE ADAPTERS CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (PAQR)

GENERAL

This category covers retrofit adapters for use in specified equipment, intended to adapt certified low-voltage power ac circuit breakers in place of those of another manufacturer. The specified equipment includes dead-front switchboards, switchgear, and the like. These retrofit adapters have been investigated in conjunction with low-voltage power AC circuit breakers and have been found suitable to carry 100% of the current rating of the low-voltage power AC circuit breakers, and to withstand the maximum fault-current levels specified on the low-voltage power ac circuit breakers.

PRODUCT MARKINGS

In addition to other required markings, the nameplate for these adapters is marked to indicate the specified equipment, including the manufacturer and model number or type, for which the adapters are intended.

RELATED PRODUCTS

See Retrofit Low-voltage AC Power Circuit Breakers Classified for Use in Specified Equipment (PASD) and Adapters, Low-voltage AC Power-switching Devices (PAQQ).

ADDITIONAL INFORMATION

For additional information, see Low-voltage AC Power-switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures," and ANSI/IEEE C37.59, "IEEE Standard Requirements for Conversion of Power Switchgear Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

RETROFIT LOW-VOLTAGE POWER-SWITCHING-DEVICE ADAPTER FOR USE ONLY IN EQUIPMENT AS DESIGNATED ON THE NAMEPLATE Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LOW-VOLTAGE AC FUSE DRAW-OUTS (PAQT)

GENERAL

This category covers fuse draw-outs intended to be installed in switchgear and connected in series with certified low-voltage ac power circuit breakers in order to extend the short-circuit current rating of the circuit breaker.

Fuse draw-outs consist of fuses or current limiters and an open fuse-trip device in a draw-out-type assembly. The open fuse-trip device will cause the associated circuit breaker to trip when any fuse or current limiter opens.

These devices have been investigated in combination with specific circuit breakers for use on circuits having an available fault current of 200,000 rms symmetrical amps, maximum, 3-phase.

PRODUCT MARKINGS

Fuse draw-outs are marked with maximum voltage, frequency, continuous current and short-circuit current ratings, and the type or catalog number designation of the circuit breaker with which it is intended to be used.

ADDITIONAL INFORMATION

For additional information, see Low-voltage AC Power-switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures," ANSI/NEMA C37.50, "Switchgear - Low Voltage AC Power Circuit Breakers Used in Enclosures - Test Procedures," and ANSI/IEEE C37.20.1, "Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illus-

Low-voltage AC Fuse Draw-outs (PAQT)—Continued

trated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low Voltage AC Fuse Draw-Out."

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LOW-VOLTAGE AC POWER CIRCUIT BREAKERS (PAQX)

GENERAL

This category covers low-voltage power circuit breakers specifically designed to provide service-entrance, feeder or branch-circuit protection or serve as a disconnecting means. This category also covers power circuit breaker enclosures. They are covered by the classifications indicated by the label designation as follows:

Low-voltage ac power circuit breaker — Without enclosure, and with or without noninterchangeable trip devices.

Low-voltage ac power breaker frame — Frame only of power circuit breaker with provision for interchangeable trip devices. A certified low-voltage power circuit breaker frame is certified for use only with a certified low-voltage ac power circuit breaker trip device.

Low-voltage ac power circuit breaker trip device — Trip device only of a power circuit breaker having provisions for interchangeable trip devices.

Low-voltage ac power-switching device enclosure — Enclosure only for individual 1-, 2- or 3-pole power circuit breaker.

The frame size determines the maximum continuous-current rating for all parts of a low-voltage ac power circuit breaker except the coils of the direct-acting trip device. The rating of the trip device determines the actual continuous-current rating.

The trip devices may contain ground-fault current, longtime-delay overcurrent, short-time-delay overcurrent and instantaneous overcurrent trip elements that may be adjustable. The tolerance of the marked position of the longtime-delay overcurrent trip setting is plus or minus 10%.

A ground-fault current trip element is one that functions at all values of current at or above a predetermined value of fault current to ground.

An instantaneous overcurrent trip element is one that functions with no purposely delayed action at all values of current at or above a predetermined value of overcurrent.

A long-time overcurrent trip element is one that functions with a purposely delayed action at all values of current between a predetermined value of overcurrent and the short-time or instantaneous pick-up settings of the circuit breaker.

A short-time-delay overcurrent trip element is one that functions with a purposely delayed action at all values of current between a predetermined value of overcurrent and the short-time current rating of the circuit breaker.

Circuit breakers without trip devices cannot of themselves respond to overcurrent, short-circuit or ground faults and are marked "No Over-Current Protection Provided" or "If Over-Current Protection is Required, Use With Type ___ Protective Relays." Circuit breakers without trip devices can respond to overcurrent when properly connected to protective relays.

PRODUCT MARKINGS

Low-voltage ac power circuit breakers are marked with maximum voltage, frequency, continuous current, short-time current, short-circuit current (interrupting rating) and control-voltage ratings. The short-time current rating is the designated limit of fault current that the low-voltage ac power circuit breaker can successfully carry for a short interval. Other rating information, such as the nominal design voltage and time-delay overcurrent trip setting, may be provided.

The short-circuit current rating of a low-voltage ac power circuit breaker may be extended by connecting a low-voltage ac fuse draw-out in series. When such connection is used, the circuit breaker is provided with means for tripping by way of a signal from an open fuse-trip device. The open fuse-trip device may be either on the fuse draw-out or on the circuit breaker. Circuit breakers are marked with the catalog or type designation of the fuse draw-out with which they are intended to be used.

ADDITIONAL INFORMATION

For additional information, see Low-voltage AC Power-switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are: ANSI/UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures," ANSI/IEEE C37.13, "Low-Voltage AC Power Circuit Breakers Used in Enclosures," IEEE C37.13A (2012), "Low-Voltage AC Power Circuit Breakers Used in Enclosures — Amendment 1: Increase of Voltages to 1000 V AC and Below"

Low-voltage AC Power Circuit Breakers (PAQX)—Continued

IEEE C37.17 (2012), "Trip Systems for Low-Voltage (1000 V and Below) AC and General Purpose (1500 V and Below) DC Power Circuit Breakers"
ANSI/NEMA C37.50, "Switchgear - Low Voltage AC Power Circuit Breakers Used in Enclosures - Test Procedures."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Low-Voltage AC Power Circuit Breaker," "Low Voltage AC Power Breaker Frame," "Low Voltage AC Power Circuit Breaker Trip Unit" or "Low Voltage AC Power Switching Device Enclosure."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Secondary Network Protectors (PARZ)

USE

This category covers secondary network protectors for use in spot or grid networks rated 600 V or less. These protectors consist of a circuit breaker and its control equipment. They are used for automatically disconnecting a transformer from a secondary network in response to predetermined electrical conditions on the primary feeder or transformer. They are also used for connecting a transformer to a secondary network either through manual control or automatic control responsive to predetermined electrical conditions on the feeder and the secondary network.

PRODUCT MARKINGS

Each secondary network protector is marked with the company name, model number and its electrical ratings, which includes the maximum short circuit rating of the device.

ADDITIONAL INFORMATION

For additional information, see Low Voltage AC Power Circuit Breakers (PAQX), Low Voltage AC Power Switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is IEEE C57.12.44, "IEEE Standard Requirements for Secondary Network Protectors."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Secondary Network Protector."

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RETROFIT LOW-VOLTAGE AC POWER CIRCUIT BREAKERS CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (PASD)

GENERAL

This category covers retrofit low-voltage ac power circuit breakers of present design that have been modified and investigated for use in place of low-voltage power ac circuit breakers of another manufacturer. These circuit breakers are intended to be installed in equipment such as dead-front switchboards, switchgear, and the like.

PRODUCT MARKINGS

In addition to other required markings, the nameplate for these circuit breakers is marked to indicate the specified equipment, including the manufacturer and model number or type, for which the circuit breakers are intended.

RELATED PRODUCTS

See Low-voltage AC Power Circuit Breakers (PAQX) and Retrofit Low-voltage AC Power-switching-device Adapters Classified for Use in Specified Equipment (PAQR).

ADDITIONAL INFORMATION

Retrofit Low-voltage AC Power Circuit Breakers Classified for Use in Specified Equipment (PASD)—Continued

For additional information, see Low-voltage AC Power-switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures," and ANSI/IEEE C37.59, "IEEE Standard Requirements for Conversion of Power Switchgear Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

RETROFIT LOW-VOLTAGE AC POWER CIRCUIT BREAKER FOR USE ONLY IN EQUIPMENT AS DESIGNATED ON THE NAMEPLATE
Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LOW-VOLTAGE AC INTEGRALLY-FUSED POWER CIRCUIT BREAKERS (PASQ)

GENERAL

This category covers low-voltage ac integrally fused power circuit breakers rated 600 V maximum. Low-voltage ac integrally fused power circuit breakers include all the mechanical features of low-voltage ac power circuit breakers and, in addition, have current limiters or current-limiting fuses that function to increase the fault-current interrupting rating of the low-voltage ac integrally fused power circuit breakers.

These devices have been investigated for use on three-phase circuits having available fault currents of 200,000 rms symmetrical amps, maximum.

In addition to overcurrent trip elements of the low-voltage ac power circuit breakers, these are provided with an anti-single-phase tripping device that automatically opens the circuit breaker contacts in response to circuit interruption by the current limiter or the current-limiting fuse.

These devices are intended for use in certified switchgear or switchboards with certified adapters.

PRODUCT MARKINGS

Low-voltage ac integrally fused circuit breakers are marked with the maximum voltage, frequency, continuous current, short-circuit current (interrupting rating), intended fuse rating and type, and control voltage ratings. Other rating information, such as the nominal design voltage and time-delay overcurrent tripping setting, may be provided.

ADDITIONAL INFORMATION

For additional information, see Low-voltage AC Power-switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures," ANSI/IEEE C37.13, "Low-Voltage AC Power Circuit Breakers Used in Enclosures," and ANSI/NEMA C37.50, "Switchgear - Low Voltage AC Power Circuit Breakers Used in Enclosures - Test Procedures."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low Voltage AC Integrally Fused Power Circuit Breaker."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PRODUCT CATEGORIES BY CATEGORY CODE

LOW-VOLTAGE AC POWER CIRCUIT PROTECTORS (PATT)

GENERAL

This category covers low-voltage ac power circuit protectors rated 240 V or 480 V, investigated for use on circuits having available fault currents of 200,000 rms symmetrical amps maximum, three-phase.

Low-voltage ac power circuit protectors consist of a low-voltage ac power circuit breaker that has been modified to omit the direct-acting tripping device and to include a Class L current-limiting fuse in series with the load terminals of each pole.

PRODUCT MARKINGS

The low-voltage ac power circuit protectors are marked with maximum voltage, frequency, continuous current, short-circuit current and control voltage(s) ratings. Other rating information, such as switching current rating, may be provided.

ADDITIONAL INFORMATION

For additional information, see Low-voltage AC Power-switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/IEEE C37.29, "IEEE Standard for Low-Voltage AC Power Circuit Protectors Used in Enclosures," and ANSI/NEMA C37.52, "Test Procedures for Low Voltage AC Power Circuit Protectors Used in Enclosures."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low Voltage AC Power Circuit Protector."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LOW-VOLTAGE DC POWER CIRCUIT BREAKERS (PAXW)

USE

This category covers stationary and draw-out low-voltage dc power circuit breakers specifically designed to provide service-entrance, feeder or branch-circuit protection. Low-voltage dc power circuit breakers are separated into four types: general purpose, rectifier, high speed and semi-high speed.

These products are intended for use in certified switchgear or switchboards with certified adapters.

PRODUCT MARKINGS

These products are marked with the type of circuit breaker, frame size, rated maximum voltage, rated continuous current, rated peak current (when applicable), rated short-time current (where applicable), rated short-circuit current and rated control voltage.

ADDITIONAL INFORMATION

For additional information, see Low Voltage AC Power Switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures," and ANSI/IEEE C37.14, "Low-Voltage DC Power Circuit Breakers Used in Enclosures."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low Voltage DC Power Circuit Breaker."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRIP DEVICES CLASSIFIED FOR USE IN LOW-VOLTAGE AC POWER CIRCUIT BREAKERS (PAYK)

USE

Trip Devices Classified for Use in Low-voltage AC Power Circuit Breakers (PAYK)—Continued

This category covers trip devices suitable for use in place of the original trip device of a low-voltage ac power circuit breaker. Certification covers only the trip device in its ability to sense and respond to overcurrent and fault-current conditions.

This category does not cover the circuit breaker on which the trip device is mounted.

ADDITIONAL INFORMATION

For additional information, see Low-voltage AC Power-switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/IEEE C37.59- (1996), "IEEE Standard Requirements for Conversion of Power Switchgear Equipment," which references ANSI/IEEE C37.13 (1990), "Low-Voltage AC Power Circuit Breakers Used in Enclosures," ANSI/IEEE C37.17 (1997), "Trip Devices for AC and General Purpose DC Low Voltage Power Circuit Breakers," ANSI/NEMA C37.50 (1989), "Switchgear Low Voltage AC Power Circuit Breakers Used in Enclosures," and ANSI/UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

TRIP DEVICE

IN ACCORDANCE WITH IEEE C37.59-[date]

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MANAGEMENT EQUIPMENT, ENERGY (PAZX)

USE

This category covers energy management equipment that energizes or de-energizes electrical loads to achieve the desired use of electrical power. This equipment normally controls electrical loads by responding to sensors or transducers monitoring power consumption, by sequencing, by cycling the loads through the use of preprogrammed data logic circuits, or any combination thereof. Devices responding to signals from a utility company may receive the signals over the power lines or as radio signals.

Typical loads controlled are space heating, air conditioning, lighting and other similar loads.

Devices are intended to be used only within the manufacturer's brand and product series as indicated in the manufacturer's instructions. Exceptions are specifically identified.

FACTORS NOT INVESTIGATED

The effects of the controls on the performance ratings of the connected loads have not been investigated.

PRODUCT MARKINGS

"Energy Management Equipment Enclosure," "Energy Management Equipment Enclosure Part," "Energy Management Equipment Subassembly" and "Energy Management Equipment Accessory" require modular labeling. The marking on the individual subassembly, or smallest container, will make reference to 1) a wiring diagram for interconnection of a system, and 2) the various combinations of subassemblies that may be employed to comprise the system unit.

RELATED PRODUCTS

Signal system units incorporating energy management systems are covered under Signal System Units (UDTZ).

Switching devices operated by a clock mechanism and other similar type products used to energize or de-energize loads are covered under Switches, Clock Operated (WGZR).

Energy-usage-monitoring equipment (not controlling loads directly) is covered under Energy Usage Monitoring Systems (FTRZ).

Measurement equipment is covered under Measuring, Testing and Signal-generation Equipment (PICQ).

Temperature-indicating and -regulating switches are covered under Temperature-indicating and -Regulating Equipment (XAPX) and Controllers, Refrigeration (SDFY).

Nonindustrial photoelectric switches for lighting control and/or motion-sensitive switches intended for nonindustrial applications are covered under Switches, Photoelectric (WJCT).

Plug-in, locking-type photocontrols for use with area lighting intended for parking lot and roadway lighting are covered under Photocontrols, Plug-in, Locking Type (WJFX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 916, "Energy Management Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Energy Management Equipment," "Open Energy Management Equipment," "Enclosed Energy Management Equipment," "Energy Management Equipment Enclosure," "Energy Management Equipment Enclosure Part," "Energy Management Equipment Subassembly" or "Energy Management Equipment Accessory."

The word "Management" may be abbreviated "Mgmt" or "Mgt" (with or without a period); the word "Equipment" may be abbreviated "Equip" or "Eqpt" (with or without a period).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MANUFACTURED HOME KITCHEN CABINETRY AND BATHTUB AND SHOWER UNITS (PDLT)

GENERAL

This category covers finished units, components, and/or materials have been Classified in accordance with the flammability requirements of the Federal Manufactured Home Construction and Safety Standards; Section 3280.203(b)(5) for kitchen cabinet doors, counter tops, back splashes, exposed bottoms, and end panels or Section 3280.203(b)(6) for plastic bath-tubs, shower units, and tub or shower doors.

The insulating, acoustical, structural, toxicity of products of combustion and other properties have not been investigated. The Classification pertains to the finished units, components, and/or materials themselves, and not to the structures in which they are installed.

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

MANUFACTURED HOME KITCHEN CABINETRY IN ACCORDANCE WITH FEDERAL MANUFACTURED HOME CONSTRUCTION AND SAFETY STANDARDS SECTION 3280.203(b)(5) WITH RESPECT TO FLAMMABILITY ONLY
Control No.

or

MANUFACTURED HOME BATHTUB AND SHOWER UNIT IN ACCORDANCE WITH FEDERAL MANUFACTURED HOME CONSTRUCTION AND SAFETY STANDARDS SECTION 3280.203(b)(6) WITH RESPECT TO FLAMMABILITY ONLY
Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MANUFACTURED HOMES (PDOV)

GENERAL

This category covers manufactured homes, which are structures, transportable in one or more sections, built on a permanent chassis and designed to be used with or without a permanent foundation.

All manufactured homes include provisions for attachment to anchoring and tie-down devices and suitable piers and footings at the installation site.

Manufactured homes are intended for installation subject to approval by the Authority Having Jurisdiction.

RELATED PRODUCTS

Prefabricated modular buildings are covered under Composite Panels (QRSY).

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM).

REQUIREMENTS

Manufactured homes intended for use as dwelling units have been classified in accordance with the Federal Department of Housing and Urban Development Manufactured Home Construction and Safety Standards, Title 24CFR, Part 3280, December 18, 1975.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

MANUFACTURED HOME

SEE HUD LABEL

No.

One Classification Mark is applied near the data plate (single-wide) or near the data plate and at eye level in the largest bedroom closet of each additional transportable section (double- and triple-wide) of each manufactured home intended for use as a dwelling unit. In addition, information concerning the equipment and appliances factory furnished as part of the manufactured home is included on a data plate posted within the building.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MARINA AND BOATYARD CABLE (PDYQ)

USE

This category covers cable intended for use as flexible branch circuit and feeder wiring in marinas and boatyards in accordance with Article 555 of ANSI/NFPA 70, "National Electrical Code."

The cable is rated 600 V, 75°C and is suitable for exposure to sunlight, fresh water, salt water, gasoline, diesel fuel and lubricating oil.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Marine Products (AAMP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 83, "Thermoplastic-Insulated Wires and Cables."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Marina and Boatyard Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MARKING AND CODING EQUIPMENT, ELECTRONIC (PGBE)

USE AND INSTALLATION

This category covers electronic marking and coding equipment rated 600 V or less. Included in this category are ink jet printers or similar systems for production line labeling and/or coding. Units covered under this category normally are located in commercial or industrial environments. This equipment may be cord connected or have provision for field wiring. The units are marked with the type or types of ink for which they have been investigated.

RELATED PRODUCTS

Printing equipment intended for use in other applications is covered under Information Technology Equipment Including Electrical Business Equipment (NWGQ) or Graphic Arts Equipment (KCQT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1950, "Safety of Information Technology Equipment, Including Electrical Business Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Marking and Coding Equipment," "Ink Jet Coding Machine," "Ink Jet Marking Machine," "Laser Coding Machine" or "Laser Marking Machine."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MATTRESSES AND PADS, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (PHLV)

USE

This category covers mattresses and pads provided with a sheet covering made of cotton material coated with an electrically conductive natural or synthetic rubber, and intended for use in flammable anesthetizing locations where it is necessary for safety to avoid the accumulation of static electricity.

Tests indicate that the electrical resistance conforms to ANSI/NFPA 99, "Health Care Facilities Code," and that the mattresses and pads, when in contact with grounded objects, will prevent accumulation of dangerous amounts of static electrical charges.

As oil is injurious to rubber compounds and impairs the electrical conductive properties of these materials, contact with oil should be avoided.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1067, "Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrically Conductive Mattress Relating to Hazardous Locations" or "Electrically Conductive Pad Relating to Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MEASURING, TESTING AND SIGNAL- GENERATION EQUIPMENT (PICQ)

GENERAL

This category covers equipment that generates electrical signals (transducers, waveform generators, and the like) or that measures, indicates and/or records electrical or nonelectrical signals, quantities, or other parameters generated by other equipment.

This equipment may incorporate circuits used to visually and audibly indicate various wiring conditions in 15 or 20 A branch circuits along with markings or instructions to identify the probable wiring conditions which cannot be determined by the tester.

The devices may include provisions for checking the functions of a ground-fault circuit interrupter (GFCI) connected to the branch circuit, or for indicating that a branch circuit is connected to an arc-fault circuit interrupter (AFCI).

AFCI indicators operate by producing a waveform similar to an arc fault. Since these devices cannot produce an actual arc fault, an AFCI indicator may not trip every AFCI. AFCI indicators are provided with markings or instructions that state the following or equivalent: "CAUTION: AFCIs recognize characteristics unique to arcing, and AFCI indicators produce characteristics that mimic some forms of arcing. Therefore the indicator may provide a false indication that the AFCI is not functioning properly. If this occurs, recheck the operation of the AFCI using the test and reset buttons. The AFCI button test function will demonstrate proper operation."

Equipment intended to be installed only in process control panels is so identified.

Equipment may be shipped completely assembled or in modular form. Modular assemblies are intended to be field assembled to form a complete system in accordance with the provided installation instructions.

Open-type measuring, testing and signal generation equipment is not provided with a complete enclosure and is intended to be placed in an industrial control panel or similar type of enclosure.

UNEVALUATED FACTORS

These products have been investigated with respect to risk of fire, shock and injury to persons. Where such equipment is included in systems that involve other pieces of equipment or mechanical operations, the investigation of the risk of fire, electric shock and personal injury has included only the equipment specifically Listed in the individual Listings. The accuracy of measured, analyzed or prepared quantities has not been investigated.

RELATED PRODUCTS

This category does not cover medical and dental or process control metering and testing equipment. Listings of equipment which measures the functional performance (nonelectrical or nonelectronic) of other equipment, the physical or chemical properties of materials or qualitative or quantitative constituent analysis of materials and preparation of materials for further analysis or measurement are covered under Laboratory Use Electrical Equipment (OGTK).

Additional Listings are covered under Electrical and Electronic Measuring and Testing Equipment (FHCW).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 61010B-1, "Electrical Measuring and Test Equipment - Part 1: General Requirements," or ANSI/UL 61010-1, "Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements," and IEC 61010-2-032, "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-032: Particular Requirements for Hand-Held and Hand-Manipulated Current Sensors for Electrical Test and Measurement," as applicable.

Equipment incorporating circuits to indicate wiring conditions in branch circuits, GFCI functions, or to indicate that a branch circuit is connected to an AFCI is additionally investigated to UL 1436, "Outlet Circuit Testers and Similar Indicating Devices."

ADJUNCT SERVICE

UL provides a service for the Verification of measuring, testing and signal generation equipment that not only meets the appropriate requirements of UL but also has been investigated to Levels I, II, III and/or IV of Annexes A and B of Performance Specification TSB-155, "Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Measuring and Testing Equipment," "Measuring Equipment," "Testing Equipment," "Signal Generation Equipment," or the name of the specific type of product as shown in the individual Listings, or combinations of the preceding identities. The product name may be preceded by the words "Open-type."

Combination Listing/Verification Mark — A Listing Mark combined with a Verification Mark is provided on products that have additionally been investigated to Levels I, II, III and/or IV of Annexes A and B of Performance Specification TSB-155. The combined Listing/Verification Mark consists of the Listing Mark elements detailed above and the statement "ALSO VERIFIED IN ACCORDANCE WITH LEVEL(S) * OF TSB-155."

* I, II, III and/or IV

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MEASUREMENT EQUIPMENT CLASSIFIED FOR USE IN HAZARDOUS LOCATIONS (PICX)

GENERAL

This category covers equipment intended for measuring physical properties, such as thickness and density, on a production line.

This equipment has been investigated for risk of explosion, fire and electric shock only.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

MEASUREMENT EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS AS TO FIRE, ELECTRICAL SHOCK AND EXPLOSION HAZARDS ONLY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MEDICAL EQUIPMENT (PIDF)

USE AND INSTALLATION

This category covers equipment intended to diagnose, treat, or monitor a patient under medical supervision, and which makes physical or electrical contact with the patient and/or transfers energy to or from the patient and/or detects such energy transfer to or from the patient.

This category also covers those accessories defined by the manufacturer as necessary for the normal use of the equipment.

Unless otherwise noted, this equipment is designed for professional use by qualified personnel in hospitals, nursing homes, medical care centers, medical and dental offices, and similar health care facilities, and in remote areas under the direction of qualified personnel, in accordance with the instructions specified by the manufacturer.

This equipment has been Classified with respect to electric shock, fire, mechanical and other specified hazards incident to its use in unclassified (ordinary) locations. The other specified hazards are those that are included in UL 60601-1 (formerly UL 2601-1) and the Particular and/or Collateral Standards to which the equipment has been investigated.

The wiring methods for installation of these products are covered by Article 517 of ANSI/NFPA 70, "National Electrical Code" (NEC). The individual units of a system may be designed to be interconnected by means of one or more of the wiring methods outlined in the NEC.

The nature of some of this equipment, such as X-ray, nuclear imaging, and magnetic resonance equipment, is such that it involves features of installation and use not ordinarily presented in utilization equipment. Such features are covered in the manufacturer's installation instructions. Installation must, if possible, be made in a room or compartment in which provision is made to prevent fire or injury to persons and, in all cases, be in accordance with the manufacturer's installation instructions furnished with the equipment and the requirements of the Authorities Having Jurisdiction.

X-radiation safety and performance requirements are regulated under Public Law 90-602 and are enforced by the U.S. Department of Health and Human Services. These criteria are outlined in Code of Federal Regulations, Title 21, Parts 1000 to 1999. Compliance with the applicable regulations under the conditions of normal and abnormal operation has not been investigated by UL.

Some of the Medical Equipment Classifications are predicated on the provision of one of two alternate attachment plugs specifically referred to in Attachment Plugs, Fuseless (AXUT). One is a locking type identified by the marking "Hospital Only" and the other is a nonlocking type ANSI Standard configuration grounding type identified by the marking "Hospital Grade" and a green dot on the body. The identification is visible after installation on the flexible cord.

Baby incubators and similar equipment for use with oxygen-enriched atmospheres have been investigated with respect to the increased hazard resulting from the presence of oxygen and electrical parts within the equipment. Motor-operated beds are marked if they are suitable for use with oxygen.

Oil bath sterilizers and similar equipment have been investigated with respect to their use with oils such as are recommended by the sterilizer manufacturer.

Products covered under this category include equipment intended to be field installed, in accordance with the instructions provided, to Classified equipment of the same manufacturer. The field-installed equipment is appropriately marked as noted below.

Individual components of the end products in this category have been investigated to applicable UL component requirements. Also, investigation of components to applicable international component requirements has been performed by UL or other appropriate certifying agency (as determined by UL). UL Follow-Up Service at the end-product manufacturing facility also determines that such components continue to bear the appropriate designated certifying agency's mark.

REBUILT PRODUCTS

This category also covers medical equipment that is rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt medical equipment is rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt medical equipment is subject to the same requirements as new medical equipment.

UNEVALUATED FACTORS

The physiological effects, beneficial or otherwise, which may be produced by this equipment have not been investigated.

RELATED PRODUCTS

Medical equipment that includes refrigerated components, such as refrigeration therapy equipment, is covered under Refrigerated Medical Equipment (SOPT).

Equipment investigated to determine its suitability for use in hazardous (classified) locations as defined in the NEC is covered under Medical Equipment for Use in Hazardous Locations (PINR).

For household health care equipment, see Personal Hygiene and Health Care Appliances (QGRZ). For heating pads, see Heating Pads, Electric (MNUV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 60601-1 (formerly UL 2601-1), "Safety of Medical Electrical Equipment, Part 1: General Requirements." Note that although redesignated as UL 60601-1, UL 2601-1 is identical to UL 60601-1 except for formatting. Therefore, products identified as investigated to either standard are subject to identical technical requirements.

Particular Standards — UL 60601-1 contains requirements for safety which are generally applicable to all medical equipment. For certain types of equipment, these requirements are supplemented or modified by the special requirements of a Particular Standard (IEC 60601-2-XX). However, unless otherwise indicated in the deviations, the requirements of a Particular Standard do not modify the deviations. Where Particular Requirements exist, the General Standard is not used alone.

Collateral Standards — When the equipment falls within the scope of one or more Collateral Standards (IEC 60601-1-XX) such standard(s) may, optionally, also be used. Unless otherwise indicated in the deviations, the requirements of a Collateral Standard do not modify the deviations.

Product Marking (with respect to applicable standards) — As part of the Classification Mark, reference to UL 60601-1 and/or UL 2601-1 is included. For products that have been investigated to the applicable Particular (IEC 60601-2-XX) and/or Collateral (IEC 60601-1-XX) Standards, reference to these standards is made on the product or in the accompanying documents.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**MEDICAL EQUIPMENT+
WITH RESPECT TO ELECTRICAL SHOCK, FIRE AND MECHANICAL
HAZARDS ONLY
IN ACCORDANCE WITH [standard*]
Control No.**

+ or other appropriate product name as shown in the individual Classifications

For rebuilt or remanufactured products the word "Rebuilt," "Remanufactured," "Refurbished" or "Reconditioned" precedes the product name.

For field-installed products the words "Field Installed" precedes the product name.

Alternate Marking Options

1. The Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol, the product name as described above, the phrase "SEE ACCOMPANYING DOCUMENTS," or the symbol of a triangle containing the exclamation point (IEC 348, Symbol 14 - Δ), the standard number* and a control number. As a minimum, the standard number* always includes UL 60601-1, UL 2601-1 or both. In addition, the product's accompanying documents will contain the complete Classification Mark.

2. For products with limited space for markings, the Classification Mark includes the UL symbol, the word "CLASSIFIED" above the UL symbol, the symbol of a triangle containing the exclamation point (IEC 348,

Symbol 14 - Δ), and a control number. In addition, the product's accompanying documents will contain the complete Classification Mark.

3. For products (such as implantable devices) where the Classification Mark is not feasible, the complete Classification Mark will appear on the carton or smallest unit container in which the product is packaged. The product's accompanying documents may also contain the complete Classification Mark.

* Based on the certification coverage of the product, the standard may be UL 60601-1, UL 2601-1 or both, applicable Particular (IEC 60601-2-XX) and/or related Collateral (IEC 60601-1-XX) Standards for which the product has been found to comply by UL.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**MEDICAL EQUIPMENT FOR USE IN
HAZARDOUS LOCATIONS (PINR)**

GENERAL

This category covers portable suction, pressure and anesthesia units, portable baby incubators, surgical devices and similar equipment designed for professional use by attendants in hospitals. This equipment has been investigated solely from the standpoint of electrical, fire, explosion, and accident hazards. Other hazards, such as physiological effects, have not been investigated.

Except for low-voltage battery-powered devices, connections to supply lines require the use of receptacles with plugs or receptacles with plugs interlocked with snap switches, or their equivalent, certified for the specified hazardous locations. The flexible cord connected to the units should be frequently inspected and replaced when necessary. Terminal connections should be properly made and maintained.

Authorities Having Jurisdiction should be consulted with regard to conditions under which these portable devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

These devices are intended for use in accordance with ANSI/NFPA 99, "Health Care Facilities Code."

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Medical Equipment for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or

any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**MEDIUM-VOLTAGE POWER CABLE
(PITY)**

GENERAL

This category covers medium-voltage cable rated 2400 to 35,000 V intended for use and installation in accordance with Article 328 of ANSI/NFPA 70, "National Electrical Code" (NEC).

The cable is single or multiconductor, aluminum or copper, with solid extruded dielectric insulation and may have an extruded jacket, metallic covering or combination of both over the single conductors or over the assembled conductors in a multiconductor power cable.

All insulated conductors rated higher than 2400 V have electrostatic shielding. Cable rated 2400 V is nonshielded.

Nonshielded cable is intended for use where conditions of maintenance and supervision ensure that only competent individuals service and have access to the installation.

PRODUCT MARKINGS

Shielded cable is marked "MV-90" or "MV-105" and is suitable for use in wet or dry locations at 90 or 105°C.

Nonshielded cable is marked either "MV-90" indicating suitability for use in wet or dry locations at 90°C maximum, or "MV-90 Dry Locations Only" indicating suitability for use only in dry locations at 90°C maximum.

Cable marked "Oil Resistant I" or "Oil Resistant II" is suitable for exposure to mineral oil at 60°C or 75°C, respectively.

Cable marked "Sunlight Resistant" may be exposed to the direct rays of the sun.

Cable intended for installation in cable trays in accordance with Article 392 of the NEC is marked "For Use in Cable Trays" (or "For CT Use").

Cable with aluminum conductors is marked with the word "Aluminum" (or "AL").

The cable is marked with the conductor size, voltage rating and insulation level (100% or 133%).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1072, "Medium-Voltage Power Cables."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Medium-Voltage Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**MEDIUM-VOLTAGE CABLE
CLASSIFIED IN ACCORDANCE WITH
UL 1072, WITH METRIC CONDUCTOR
SIZES (PIVW)**

GENERAL

This category covers medium-voltage cable rated 2400 to 35,000 V and in conductor sizes 10 through 500 sq mm.

The cable complies with all requirements specified in ANSI/UL 1072, "Medium-Voltage Power Cables," except that metric conductor sizes are used instead of AWG sizes. The cable is for use in jurisdictions where metric conductor sizes are required or permitted.

The cable is single or multi-conductor, aluminum or copper, with solid extruded dielectric insulation. An extruded jacket, metallic covering, or combination of both may be provided over single conductors or over the assembled conductors in a multi-conductor power cable.

All insulated conductors rated higher than 2400 V have electrostatic shielding. Cable rated 2400 V is nonshielded.

Nonshielded cable is intended for use where conditions of maintenance and supervision ensure that only competent individuals service and have access to the installation.

**MEDIUM-VOLTAGE CABLE CLASSIFIED IN ACCORDANCE
WITH UL 1072, WITH METRIC CONDUCTOR SIZES (PIVV)**
PRODUCT MARKINGS

Shielded cable is marked "MV-90" or "MV-105" and is suitable for use in wet or dry locations at 90°C or 105°C.

Nonshielded cable is marked either "MV-90" indicating suitability for use in wet or dry locations at 90°C maximum, or "MV-90 Dry Locations Only."

Cable marked "oil resistant I" or "oil resistant II" is suitable for exposure to mineral oil at 60°C or 75°C, respectively.

Cable marked "sunlight resistant" may be exposed to the direct rays of the sun.

Cable intended for installation in cable trays is marked "For CT Use" or "For Use In Cable Trays."

Cable with aluminum conductors is marked with the word "Aluminum" or the letters "AL."

Cable is marked with conductor size in sq mm, voltage rating and insulation level (100% or 133%).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1072, "Medium-Voltage Power Cables."

UL MARK

The Classification Mark of UL on the product, the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products shall only be as illustrated below:

**MEDIUM VOLTAGE CABLE
CLASSIFIED BY UNDERWRITERS LABORATORIES INC®
IN ACCORDANCE WITH UL 1072, WITH METRIC
CONDUCTOR SIZES**

No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

METAL-CLAD CABLE (PJAZ)

GENERAL

This category covers Type MC metal-clad cable. The cable is rated for use up to 2000 V, and certified in sizes 18 AWG through 2000 kcmil for copper, 12 AWG through 2000 kcmil for aluminum or copper-clad aluminum, and employs thermoset or thermoplastic insulated conductors. It is intended for installation in accordance with Article 330 of ANSI/NFPA 70, "National Electrical Code" (NEC).

The cable consists of one or more insulated circuit conductors, a grounding path (grounding conductor, metal sheath, or combination thereof) as described below, one or more optional optical fiber members, and an overall metal sheath. The metal sheath is an interlocked metal tape, a corrugated metal tube, or a smooth metal tube. The metal sheath of single-conductor cable is nonferrous. A nonmetallic jacket may be provided under and/or over the metal sheath. Cable with metal armor, rated 2400 to 35,000 V is covered under Medium-voltage Power Cable (PITY) and is marked "Type MV or MC."

Cable with interlocked armor that has been determined to be suitable for use as a grounding means has interlocked aluminum or steel armor in direct contact with a single, full-sized, bare aluminum grounding/bonding conductor. This cable is marked to indicate that the armor/grounding conductor combination is suitable for ground. The equipment grounding conductor required within all other cable with interlocked armor may be insulated or bare, may be sectioned, and is located in the cable core but not in contact with the armor. Any additional grounding conductors of either design have green insulation. One insulated grounding conductor may be unmarked, one other may have only a yellow stripe and the balance have surface markings that indicate they are additional equipment grounding conductors or isolated grounding conductors.

The sheath of the smooth or corrugated tube Type MC cable or a combination of the sheath and a supplemental bare or unstriped green insulated conductor is suitable for use as the ground path required for equipment grounding. The supplemental grounding conductor may be sectioned. When sectioned, all sections are identical. Each additional green insulated grounding conductor has either a yellow stripe or a surface marking or both to indicate that it is an additional equipment or isolated grounding conductor. Additional grounding conductors, however marked, are not smaller than the required grounding conductor.

PRODUCT MARKINGS

Information regarding temperature rating, voltage rating, cable and conductor Type and AWG size is shown either on a marker tape under the armor or on the surface of a nonmetallic jacket, if used.

METAL-CLAD CABLE (PJAZ)

301

Copper-clad aluminum conductors are surface printed "AL (CU-CLAD)" or "Cu-clad AL." Aluminum conductors are surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

For termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

Cable suitable for use in cable trays, direct sunlight or direct burial application is so marked. Cable marked for direct burial is also considered acceptable for encasement in concrete.

Cable marked "Oil Resistant I" (or "Oil Res I") is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is marked "Oil Resistant II" (or "Oil Res II").

Cable containing one or more optical fiber members is marked "MC-OF."

Cable with a nonmetallic outer jacket that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," and all unjacketed metal-clad cable may be marked with the suffix "-LS."

Cable with an interlocked armor that is intended as a ground path is marked "armor is grounding path component," and is provided with installation instructions.

Cable intended for use in hazardous (classified) locations, Class I, Division 1, Groups A, B, C and D; Class II, Division 1, Groups E, F and G; Class I, Zone 1, Groups IIA, IIB and IIC in accordance with the NEC, is marked "MC-HL." See Cable for Use in Hazardous Locations (PJPP) for Certification Mark requirements for cable marked "MC-HL."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1569, "Metal-Clad Cables."

Cable marked "MC-HL" has been additionally investigated to ANSI/UL 2225, "Cables and Cable Fittings for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Metal-clad cable that contains copper or copper-clad aluminum conductors has the product name "Metal-clad Cable"; metal-clad cable that contains aluminum conductors has the product name "Metal-clad Aluminum Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

METAL-CLAD CABLE CONNECTORS, TYPE MC (PJOX)

GENERAL

This category covers fittings for use with metal-clad cable, Type MC, employing (a) interlocking aluminum or steel tape, (b) interlocking aluminum or steel armor ground cable, (c) smooth aluminum tube, or (c) corrugated aluminum or copper tube. The interlocking aluminum or steel armor ground cable is intended for use as a ground and is marked "Armor is equipment grounding path component." This product is intended for installation and use in accordance with the following information and the limitations specified in Metal-clad Cable (PJAZ).

All male threaded fittings have only been investigated for use with lock-nuts.

Connector Selection — Connectors are intended to be selected in accordance with the size and type of cable for which they are designated. Bronze connectors are intended for use only with cable employing corrugated copper tube. Aluminum connectors are intended for use only with cable employing corrugated aluminum, interlocking aluminum or smooth aluminum tube, unless marked otherwise on the carton (see **PRODUCT MARKINGS** below).

Use in Concrete — Fittings made of aluminum are not considered suitable for use in concrete or cinder fill unless protected with asphalt paint or the equivalent. Fittings suitable for use in concrete are identified by a marking on the carton.

Grounding — Metal-clad-cable connector and cable combinations in the following table are suitable for grounding for use in circuits over and under 250 V and where installed in accordance with ANSI/NFPA 70, "National Electrical Code."

Cable	Connector Type
Interlocking aluminum or steel armor ground cable	MCIA
Corrugated aluminum or copper tube	MCC
Smooth aluminum tube	MCS

Connector types are specifically identified on the manufacturer's product or on the smallest unit container in which the product is packaged.

Dry and Wet Locations — Nonmetallic parts, such as glands or seals, are suitable for use at a temperature of 90°C in dry and wet locations. The fittings are suitable for use in dry or wet locations unless marked otherwise (see **PRODUCT MARKINGS** below).

Use with Armored Cable — Metal-clad-cable connectors also suitable for use with armored cable, Type AC, are so marked on the device or carton. Certified armored cable, Type AC, is covered under Armored Cable Connectors, Type AC (AWSX).

Use with Flexible Metal Conduit — Metal-clad-cable connectors also suitable for use with flexible metal conduit, Types FMC, RWFMC and XRWFMC, are so marked on the device or carton. Certified flexible metal conduit connectors, Types FMC, RWFMC and XRWFMC, are covered under Conduit Fittings (DWTI).

Reusability — Connectors have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction.

PRODUCT MARKINGS

Metal-clad-cable fittings or the smallest unit shipping cartons are marked with (1) the range of cable diameters and the type of cable sheath (corrugated, interlocking or smooth), (2) the material of the sheath (aluminum, copper or steel) for which they have been investigated, (3) "Concrete-tight" if suitable for use in poured concrete, (4) "For Type AC Cable" (or equivalent wording) if suitable for that use, and (5) "For FE or AL (unless for use with both FMC, RWFMC or XRWFMC" (or equivalent wording). See the following table for additional carton markings. Metal-clad-cable fittings suitable for use only in dry locations are marked "Dry Locations" on the device and smallest unit carton.

Type of Metal-clad Cable	Abbreviation
Metal-clad interlocking armor cable	MCI
Metal-clad interlocking armor ground cable	MCI-A
Metal-clad continuous smooth sheath armor cable	MCS
Metal-clad continuous corrugated sheath armor cable	MCC
Metal-clad continuous corrugated sheath armor cable, flat	FLAT

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Metal-clad (Type MC) Cable Connector."

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METAL-CLAD CABLE CLASSIFIED IN ACCORDANCE WITH UL 1569, WITH METRIC CONDUCTOR SIZES (PJPJ)

GENERAL

METAL-CLAD CABLE CLASSIFIED IN ACCORDANCE WITH UL 1569, WITH METRIC CONDUCTOR SIZES (PJPJ)

This category covers Type MC metal-clad cable. It is rated for use up to 2000 V, and certified in sizes 1.5 through 35 sq mm copper, 4.0 through 35 sq mm aluminum or copper-clad aluminum and employs thermoset or thermoplastic insulated conductors.

The cable complies with all the requirements specified in UL 1569, "Metal-Clad Cables," except that metric conductor sizes are used instead of AWG/kcmil sizes. This cable is for use in jurisdictions where metric conductor sizes are required or permitted.

Type MC cable is of three designs (a) interlocked metal tape, (b) corrugated tube and (c) smooth tube, and all are intended for aboveground use except when marked for direct burial.

The armor of the interlocked metal tape type may or may not be used for grounding. Interlocked armor constructions that may be used as a ground path have a grounding/bonding conductor outside the cable core and in direct contact with the armor. Interlocked armor constructions that are not intended as a ground path have a grounding conductor inside the cable core and not in contact with the armor. The tube of corrugated or smooth tube Type MC Cable in combination with the equipment grounding conductor, when provided, is suitable for grounding; otherwise the tube by itself is suitable for grounding.

PRODUCT MARKINGS

Information regarding temperature rating, voltage rating, cable and conductor Type and sq mm size is shown either on a marker tape under the armor or on the surface of a nonmetallic jacket, if used.

Copper-clad aluminum conductors are surface printed "AL (CU-CLAD)" or "Cu-Clad AL." Aluminum conductors are surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

Cable suitable for use in cable trays, direct sunlight or direct burial application is so marked.

Cable marked "Oil Resistant I" (or "Oil Res I") is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is marked "Oil Resistant II" (or "Oil Res II").

Cable with an interlocked armor that is intended as a ground path is marked "armor is grounding path component," and is provided with installation instructions.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1569, "Metal-Clad Cable."

UL MARK

The Classification Mark of UL on the product, the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products shall only be as illustrated below using the appropriate product name: Metal-clad cable that contains copper or copper-clad aluminum conductors has the product name "Metal-Clad Cable"; metal-clad cable that contains aluminum conductors has the product name "Metal-Clad Aluminum Cable."

[PRODUCT NAME]

CLASSIFIED BY UNDERWRITERS LABORATORIES INC. IN ACCORDANCE WITH UL 1569, WITH METRIC CONDUCTOR SIZES

No.

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CABLE FOR USE IN HAZARDOUS LOCATIONS (PJPP)

GENERAL

This category covers Type MC-HL metal-clad cable and Type ITC-HL instrumentation tray cable for use in Class I and II hazardous (classified) locations.

Type MC-HL cable is rated up to 35,000 V, and Listed in sizes 18 AWG through 2000 kcmil for copper, 12 AWG through 2000 kcmil for aluminum, or copper-clad aluminum, and employs thermoset- or thermoplastic-insulated conductors. It is intended for installation in accordance with Articles 330, 501 502 and 505 of ANSI/NFPA 70, "National Electrical Code"

(NEC). Cable containing conductors rated 2 kV may be used in circuits operating at 2 kV, nominal or less, in accordance with Articles 600 and 490 of the NEC. Cable containing conductors rated 5,000 to 35,000 V is intended for installation and use in accordance with Articles 328, 501, 502 and 505 of the NEC.

Type MC-HL cable consists of two or more insulated conductors, one or more grounding conductors, and an overall gas/vapor tight continuous corrugated metallic sheath. A nonmetallic jacket is provided over the metal sheath.

The equipment grounding conductor required within Type MC-HL cable may be insulated or bare and may be sectioned. Any additional grounding conductors have green insulation.

Type ITC-HL cable is rated for use on circuits up to 150 V and 5 A. The conductors are size 22 AWG through 12 AWG copper or thermocouple alloy with thermostat or thermoplastic insulation. The cable is intended for installation in accordance with Articles, 501, 502, 505 and 727 of the NEC.

Type ITC-HL cable consists of two or more insulated conductors, with an overall gas-/vapor-tight continuous corrugated metallic sheath and with nonmetallic jackets both under and over the metal sheath. An equipment-grounding conductor may be provided within a Type ITC-HL cable and may be insulated or bare.

PRODUCT MARKINGS

Information regarding temperature rating, voltage rating, cable and conductor Type and AWG size is shown on the surface of a nonmetallic jacket. The cable is marked as described in Metal-clad Cable (PJAZ) or Instrumentation Tray Cable (NYTT), except the suffix “-HL” follows “MC” or “ITC.”

RELATED PRODUCTS

See Cable Fittings for Use in Hazardous Locations (CYMX) and Cable Fittings for Use in Class I, Zone Classified Hazardous Locations (CYM).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1569, “Metal-Clad Cables,” ANSI/UL 2250, “Instrumentation Tray Cable,” and UL 2225, “Metal-Clad Cables and Cable-Sealing Fittings for Use in Hazardous (Classified) Locations.”

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name as appropriate: Metal-clad cable that contains copper or copper-clad aluminum conductors has the product name “Metal-clad Cable for Use in Hazardous Locations”; metal-clad cable that contains aluminum conductors has the product name “Metal-clad Aluminum Cable for Use in Hazardous Locations” or “Instrumentation Tray Cable for Use in Hazardous Locations.”

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METER-MOUNTING EQUIPMENT (PJSR)

This category covers meter-mounting equipment, which consists of an enclosure, wiring terminals and provision for fastening the meter to the equipment. Meter-mounting equipment does not include a meter, overcurrent devices, instrument transformers, arcing or switching parts, or the like. A meter socket may include provisions for installation of current transformers within the meter socket enclosure.

Meter-mounting equipment is marked with a continuous amp rating and may, in addition, have a maximum use (intermittent) amp rating of not more than 125% of the continuous amp rating. Meter-mounting equipment accommodating two or more meters is marked with a continuous current line bus rating (may also be referred to as an overall assembly rating) and may, in addition, have an overall maximum use (intermittent) line bus rating (or overall assembly rating) of not more than 125% of the continuous line bus rating.

This equipment is intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is on a wiring diagram or other readily visible location and is independent of any marking on a terminal connector unless the terminal connector is an integral, nonremovable part of the meter socket jaw.

Wire connectors in Listed meter-mounting equipment are intended to accommodate one conductor only unless use with more than one conductor is clearly indicated on the wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 75°C ampacities for wire as specified in Table 310.16 of ANSI/NFPA 70, “National Electrical Code” (NEC). However, 3-wire, single-phase service entrance or feeder conductors for dwelling units may be as covered in Section 310.15(B)(6) of the NEC. Termination provisions are determined based on values provided in Table 310.16 or Section 310.15(B)(6), with no adjustment made for correction factors.

Meter-mounting equipment is marked with the enclosure type described in Electrical Equipment for Use in Ordinary Locations (AALZ).

A post-mounted meter socket, having an open bottom for the entry of underground conductors, is provided with:

- A marking showing the final grade level, which should be no less than 2 ft (0.6 m) above the lower end of the enclosure for a self-supported post and 18 in. (457 mm) for a separately supported post, and
- Instructions for setting the post in concrete or for securing to other mounting support.

A pedestal-mounted meter socket is intended to be mounted on a concrete base through which the underground conductors enter the enclosure by means of conduit. Mounting pedestals constructed of a coated aluminum base are provided with recommended installation procedures to avoid damage to the pedestal.

Meter-mounting equipment with a mounting post or pedestal either has ventilation to inhibit condensation or is provided with instructions for the use of sealing facilities.

Unless marked otherwise, meter-mounting equipment with a post or pedestal is not intended to serve as the sole support of a mast for overhead wiring.

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METER FITTINGS (PJVV)

GENERAL

This category covers meter fittings, which are designed to accommodate bolt-in type watt-hour meters and similar meters.

Ratings of certified meter fittings are limited to 600 V ac maximum and 400 A maximum.

Meter fittings are marked with their short-circuit current rating in rms symmetrical amps. For short-circuit ratings exceeding 10 kA rms symmetrical, the marking includes the type and rating of overcurrent protection to be used with the meter fitting.

ADDITIONAL INFORMATION

For additional information, see Meter-mounting Equipment (PJSR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 414, “Meter Sockets.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Meter Fitting.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

METER-SOCKET BASES (PJWT)

GENERAL

This category covers meter-socket bases, which are bases intended to accommodate plug-in-type watt-hour and similar meters rated for use with current transformers. They are designed to be installed, with the meter, inside enclosures to allow for connection in accordance with ANSI/NFPA 70, “National Electrical Code.”

Meter-socket bases are rated 600 V ac maximum. Meter-socket bases rated over 30 A are marked with their short-circuit-current rating in rms symmetrical amps. For short-circuit-current ratings exceeding 10 kA, the marking includes the type and rating of overcurrent protection to be used with the meter socket.

Meter-socket Bases (PJWT)—Continued

Meter-socket bases are marked with a continuous amp rating and may, in addition, have a maximum use (intermittent) rating of not more than 125% of the continuous amp rating.

RELATED PRODUCTS

Meter sockets with meters protruding through the enclosure are covered under Meter Sockets (PJYZ).

ADDITIONAL INFORMATION

For additional information, see Meter-mounting Equipment (PJSR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 414, "Meter Sockets."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Unenclosed Meter Socket."

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METERING TRANSFORMER CABINETS (PJXS)

GENERAL

This category covers metering transformer cabinets, which consist of an enclosure and provisions for accommodating current transformers. They do not include the current transformers. They may have provision for the mounting of plug-in-type watt-hour meters. They may also include wiring terminals and buses to accommodate bus-type current transformers.

Metering transformer cabinet interiors are intended for field installation into enclosures. Unless marked for use in a specific enclosure, wiring space has not been investigated.

Ratings of certified metering transformer cabinets and interiors are limited to 600 V ac maximum and 6000 A maximum.

Metering transformer cabinets intended for use with specific metering transformer cabinet interiors and the interiors themselves are marked with their short-circuit-current rating in rms symmetrical amps.

ADDITIONAL INFORMATION

For additional information, see Meter-mounting Equipment (PJSR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 414, "Meter Sockets."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Metering Transformer Cabinet" or "Metering Transformer Cabinet Interior."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

METER SOCKETS (PJYZ)

GENERAL

This category covers meter sockets, which are complete enclosures accommodating plug-in-type watt-hour and similar meters. They provide terminating means for conductors of wiring systems recognized by ANSI/NFPA 70, "National Electrical Code."

The tightening torque required for terminal screws is specified by a marking.

Terminal-wire connectors may be omitted and, if omitted, a marking specifies which connectors are intended to be used. Instructions for the field installation of connectors are provided with the connectors.

Meter sockets are suitable for supply wiring to enter the enclosure from either the top or the bottom, unless the meter socket is marked "Overhead Feed Only" or "Underground Feed Only," or the equivalent. The marking "Top Feed" is considered equivalent to "Overhead Feed," and "Bottom Feed" is considered equivalent to "Underground Feed."

Meter Sockets (PJYZ)—Continued

The ratings of these meter sockets are limited to 600 V ac maximum and to 400 A maximum through any one meter.

Meter sockets rated over 30 A are marked with their short-circuit-current rating in rms symmetrical amps. For short-circuit-current ratings exceeding 10 kA, the marking includes the type and rating of overcurrent protection to be used with the meter socket.

Meter sockets are marked with a continuous amp rating and may in addition have a maximum use (intermittent) amp rating of not more than 125% of the continuous amp rating.

ADDITIONAL INFORMATION

For additional information, see Meter-mounting Equipment (PJSR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 414, "Meter Sockets."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Meter Socket."

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METER-SOCKET ACCESSORIES (PKAX)

GENERAL

The category covers accessories intended for use with meter sockets, such as jumper covers, meter-socket extenders or other equipment.

Ratings of certified meter-socket accessories are limited to 600 V ac and 400 A maximum.

Meter-socket accessories are only considered suitable for use in meter sockets with a short-circuit-current rating not exceeding 10 kA rms symmetrical, unless the accessory is otherwise marked.

RELATED PRODUCTS

See Meter Sockets (PJYZ).

ADDITIONAL INFORMATION

For additional information, see Meter-mounting Equipment (PJSR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 414, "Meter Sockets."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Meter Socket Accessory," "Temporary Jumper Cover Accessory" or "Meter Socket Extender," or other appropriate product name as shown in the individual Listings.

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METER-SOCKET ADAPTERS FOR COMMUNICATIONS EQUIPMENT (POBN)

GENERAL

This category covers wireline and wireless communications equipment, and power supplies powering such equipment, installed in a meter-socket adapter. These devices may be connected on the line side of the service disconnect in accordance with Section 230.82(9) of ANSI/NFPA 70, "National Electrical Code." These devices are associated with network communications equipment powered at the premises and may also be associated with Smart Grid applications. Equipment may be provided with one- or two-way communication, by means of power-line carrier signals, telephone, cable, wireless communication, or other methods. This equipment may additionally provide signals for the control of electrical loads or electrical power generation equipment in response to signals received from the utility or local communication networks.

METER-SOCKET ADAPTERS FOR COMMUNICATIONS EQUIPMENT (POBN)

Meter-socket adapters for communications equipment do not include a meter and do not perform the function of metering utility power for the purpose of revenue billing, but may be used for the communication of such information. This category does not cover the performance characteristics associated with the transmission of metering data.

Meter-socket adapters for communications equipment do not include overcurrent devices for the electrical service. Overcurrent protection is provided for the communications equipment. A means to disconnect the communications equipment from the supply is provided as either an integral part of the equipment, or the communications equipment is disconnected from the source by removal of the meter.

Ratings for that portion of the adapter associated with the incoming power circuit are limited to 600 V ac and 400 A maximum. Adapters are marked with a continuous-current rating for the power circuit and may, in addition, have a maximum use (intermittent) current rating of not more than 125% of the continuous-current rating. Adapters rated over 30 A are marked with their short-circuit-current rating in rms symmetrical amperes and the maximum voltage rating for each marked short-circuit-current rating. Adapters rated 30 A or less (intended for use with current transformers) are not required to be marked with a short-circuit-current rating.

Meter-socket adapters for communications equipment are only considered suitable for use in meter sockets with a short-circuit-current rating not exceeding 10 kA rms symmetrical, unless the device is otherwise marked.

Devices suitable for outdoor use are so marked.

RELATED PRODUCTS

Meter sockets and related accessories are covered under Meter Sockets (PJYZ) and Meter-socket Accessories (PKAX).

Meter-socket bases are covered under Meter-socket Bases (PJWT).

Incomplete assemblies intended for use in other equipment to provide for the mounting of watt-hour meters are covered under Meter-socket Bases and Associated Assemblies (POCQZ).

Meter fittings are covered under Meter Fittings (PJVV).

Electric utility meters are covered under Meters, Electric Utility (POCZ).

Meters and other equipment for metering of electricity, other than Type A and Type S meters, are covered under Energy Usage Monitoring Systems (FTRZ).

Metering transformer cabinets are covered under Metering Transformer Cabinets (PJXS).

Energy management equipment that does not include electric metering is covered under Management Equipment, Energy (PAZX).

Type 1 surge-protective devices intended for installation on the line side of the service disconnect in meter-socket enclosures or adapters are covered under Surge-protective Devices (VZCA).

Transfer switches intended for mounting in a meter base, on the line side of the service disconnect switch, are covered under Meter-mounted Transfer Switches (WPXV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 414, "Meter Sockets," in addition to the requirements contained in UL Subject 2745, "Outline of Investigation for Meter Socket Adapters for Communications Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Meter-socket Adapter for Communications Equipment" (or "Meter-socket Adapter for Comm Equip").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

METERS, ELECTRIC UTILITY (POCZ)

USE AND INSTALLATION

This category covers electric utility meters that measure, monitor, record, transmit, or receive electrical energy generation or consumption information. The primary function of these devices is to monitor energy consumption for the purpose of revenue metering.

Meters covered under this category include detachable (Type S) meters and nondetachable bottom-connected (Type A) meters. Plug-in-type meters are intended for installation in meter sockets, meter-socket bases, metering transformer cabinets, or other equipment (such as panelboards) incorporating provisions for plug-in-type meters.

METERS, ELECTRIC UTILITY (POCZ)

These devices may communicate with other devices by means of power-line carrier, satellite/radio frequency, telephone, cable or other means. Communication may be one- or two-way communication. One-way communication is typically for the purposes of data collection and/or reporting, including automated meter reading (AMR) capability. Two-way communication is typically used as part of an advanced metering infrastructure (AMI), which may include signaling other equipment in the infrastructure to take some action in response to electrical demand. This category does not cover any portion of the AMI other than the meter.

The ratings of equipment in this category are limited to 600 V ac maximum, with a maximum of 400 A through any one meter.

These meters are intended for installation in unclassified locations. These meters may or may not be under the exclusive control of the serving electric utility.

RELATED PRODUCTS

Meter-mounting equipment is covered under the following categories:

- Meter Sockets (PJYZ)
- Meter-socket Bases (PJWT)
- Metering Transformer Cabinets (PJXS)
- Meter Fittings (PJVV)

Energy management equipment that does not include electric metering is covered under Management Equipment, Energy (PAZX).

Meters and other equipment for metering of electricity, other than Type A and Type S meters, are covered under Energy Usage Monitoring Systems (FTRZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2735, "Outline of Investigation for Electric Utility Meters."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Utility Meter."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MICROWAVE AND CABLE COMMUNICATION EQUIPMENT (POFV)

This category covers microwave communication equipment, cable communication equipment, communication antennas and antenna positioning equipment intended for household or commercial use.

This equipment has been investigated with respect to risk of fire, electric shock and personal injury. Where such equipment is included in systems that involve other pieces of equipment or mechanical operations, the investigation of the risk of fire, electric shock and personal injury have included only the equipment specifically noted in the individual Listings.

Video tape recorders, video cameras and related accessories are covered under Audio/Video Apparatus (AZSQ) and Audio and Video Equipment (AZUJ).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MICROWAVE COMMUNICATION EQUIPMENT CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (POVJ)

These products are retrofit kits consisting of parts intended for field installation in microwave communication equipment. These products have been evaluated by UL to determine that when installed in accordance with the manufacturer's instructions they do not adversely affect the operation of the Specified Equipment. The installation instructions provided with each kit provide the information identifying the specific equipment into which the kit may be installed.

Microwave Communication Equipment Classified for Use in Specified Equipment (POVJ)—Continued

For additional information, see Microwave and Cable Communication Equipment (POFV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

The basic Standard used to investigate these retrofit kits is UL 1409, Low-Voltage Video Products Without Cathode Ray Tube Displays.

The Classification Mark of UL on the product is the only method provided by UL to identify products which have been produced under its Classification and Follow-Up Service.

**Microwave Communication Equipment
Retrofit Kit
Classified By
Underwriters Laboratories Inc. ®
For Installation in Specified
Microwave Communication Equipment
Identified in the
Manufacturers Installation Instructions.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MINERAL-INSULATED CABLE ASSEMBLIES FOR USE IN HAZARDOUS LOCATIONS (POWD)

GENERAL

This category covers lengths of certified mineral-insulated metal-sheathed cable with one or both ends factory terminated with a certified mineral-insulated cable fitting. The fittings provide threaded connection of the cable to hazardous locations equipment.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product, or the Listing Mark on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Mineral Insulated Cable Assembly for Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MINERAL-INSULATED CABLE FITTINGS FOR USE IN HAZARDOUS LOCATIONS (POWX)

GENERAL

This category covers termination fittings for providing threaded connection of mineral-insulated cable to hazardous locations equipment.

These fittings are provided with a screw-on pot for sealing ends of cable with a special compound supplied by the manufacturer of fittings and a connector having conduit threads for attachment to hazardous locations equipment.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product, or the Listing Mark on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Mineral Insulated Cable Fitting for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MINERAL-INSULATED METAL-SHEATHED CABLE (PPKV)

GENERAL

This category covers mineral-insulated (Type MI) metal-sheathed cable, which consists of one or more solid copper conductors insulated with highly compressed magnesium oxide and enclosed in a continuous copper or alloy steel sheath, with or without a nonmetallic jacket. It is intended for use in accordance with Article 332 of NFPA 70, "National Electrical Code." Cable rated 600 V is labeled in sizes 16 AWG to 500 kcmil single conductor, 16 to 4 AWG two and three conductor, 16 to 6 AWG four conductor, and 16 to 10 AWG seven conductor constructions. Cable rated 300 V is labeled in two, three, four and seven conductor, sizes 18 to 16 AWG, for use on signaling circuits.

The copper sheath is suitable as an equipment grounding conductor. For cable with alloy steel outer sheath one of the conductors is to be used for equipment grounding.

Nonmetallic jackets or coatings have not been investigated for resistance to corrosion.

PRODUCT MARKINGS

Information regarding voltage rating, cable Type, and conductor size is shown either on a tag affixed to the reel or carton, or on the surface of the metal sheath. If a nonmetallic jacket is used, the information is printed on the surface of the jacket.

Cable with nonmetallic jackets has the following marking on a tag affixed to the reel or carton: "Not suitable for use in Ducts, Plenums or Other Spaces used for environmental air."

Cable with nonmetallic jackets marked "Not suitable for use on or in buildings" has not been investigated for fire retardance but are sunlight resistant.

Cable with nonmetallic jackets that has been investigated for use in cable trays is surface marked "CT Use" or "Cable Tray Use" and may additionally be marked "Sunlight Resistant" if applicable.

RELATED PRODUCTS

Terminations especially investigated for use with this cable are covered under Mineral-insulated-cable Fittings (PPYT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of UL on the attached tag, coil, reel, or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Mineral Insulated Metal-Sheathed Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MINERAL-INSULATED CABLE FITTINGS (PPYT)

GENERAL

This category covers fittings intended for use with mineral-insulated cable (Type MI) and small-diameter mineral-insulated cable. These fittings are suitable for use at a maximum operating temperature of 90°C in dry locations and 60°C in wet locations. A complete box connector consists of a connector body and a screw-on potting fitting. These fittings are intended for installation and use in accordance with the following information and the limitations specified in Mineral-insulated Metal-sheathed Cable (PPKV).

Mineral-insulated Cable Fittings (PPYT)—*Continued*

All male threaded fittings have only been investigated for use with lock-nuts.

Screw-on Potting Fitting — The screw-on potting fitting to be used with the connector may be used separately as an end fitting for change to open wiring. The screw-on potting fitting is intended to be assembled with a special tool and consists of a screw-on pot, insulating cap, insulating sleeving, anchoring bead, and sealing compound.

Grounding — These fittings are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with ANSI/NFPA 70, "National Electrical Code."

Reusability — Fittings have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction.

ADDITIONAL INFORMATION

For additional information, see Mineral-insulated Metal-sheathed Cable (PPKV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Mineral Insulated Cable Fitting," "Connector" or "Box Connector," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MODULAR DATA CENTERS (PQVA)**GENERAL**

This category covers modular data centers (MDC), which are self-contained assemblies of information technology equipment (ITE) installed within prefabricated enclosures. MDCs may be provided with integral support equipment such as power distribution units, HVAC equipment, standby power, illumination and the like, that are required for the operation of the ITE. In some cases, the support equipment may be housed in its own separate enclosure, and certified as part of the MDC system. Modular data centers, as covered under this category, are sometimes referred to as "containerized data centers."

MDCs are comprised of the enclosure, all equipment and components located within the enclosure, and all components mounted to the walls of the enclosure.

MDCs may permit the temporary entry of authorized personnel within the enclosure for service, maintenance and upgrading of the ITE and associated support equipment. They are not intended to provide an occupied space (as in an office) for personnel.

MDCs are investigated as complete equipment including subassemblies, power distribution, cabling, cooling system components, lighting and the like, installed within the enclosure. Consideration has also been given to emergency egress of maintenance personnel and working space around equipment. MDCs are not investigated as an ITE room as described in ANSI/NFPA 75, "Fire Protection of Information Technology Equipment," and Article 645 of ANSI/NFPA 70, "National Electrical Code" (NEC).

When provided, fire protection and detection equipment has been investigated for compliance with the appropriate codes and standards applying to these installations, such as ANSI/NFPA 72, "National Fire Alarm and Signaling Code," ANSI/NFPA 12, "Carbon Dioxide Extinguishing Systems," ANSI/NFPA 12A, "Halon 1301 Fire Extinguishing Systems," and ANSI/NFPA 2001, "Clean Agent Fire Extinguishing Systems."

This category does not cover preconfigured ITE rooms that are shipped as individual pieces of equipment or subassemblies and assembled on-site.

USE AND INSTALLATION

These MDCs are rated 600 V or less and are intended to be installed in accordance with the NEC.

MDCs are pre-configured and, except as permitted below, are pre-assembled at the manufacturing location and are shipped and installed intact, requiring only electrical, network and cooling system hookups (when external cooling equipment is used) at the installation site.

An MDC may be shipped from the factory unassembled, or disassembled to the degree necessary to facilitate shipment. In some cases, sub-assemblies may be shipped separately for final assembly at the installation site. In these cases, the following apply:

1. All of the parts are furnished or specified by the manufacturer.
2. The specific location of the assemblies in the MDC and their methods of installation are predetermined by the manufacturer and are not dependent upon installation personnel.
3. Electrical connections used to connect the field-installed components within the cabinet are accomplished by means of plugs and receptacles, or other means that are in compliance with the NEC.
4. Detailed step-by-step installation instructions are provided in the form of installation instructions or a detailed installation practice.
5. Parts and subassemblies are marked with the assembly manufacturer's company name or logo, and a part number (P/N) or other type designation.

An MDC may be constructed with empty space or bays or empty shelf or rack space for the installation of ITE that is not specifically defined by, or under the control of, the MDC manufacturer. The generic type of ITE, together with its installation, connection and maximum ratings, is defined by the MDC manufacturer and this information is included in the system drawings and schematics. Maximum permissible weight loads of the auxiliary ITE is predetermined by the MDC manufacturer and this information is included in the installation instructions and system diagrams for the MDC. A marking is provided as part of, or in the vicinity of, the main MDC nameplate stating the following or its equivalent: "ATTENTION! This MDC is provided with space for the installation of auxiliary IT equipment that is not evaluated as part of the MDC certification. Refer to [drawing /document number] for a complete list of equipment that is included as part of the certification of this MDC. Unevaluated equipment is subject to inspection and approval by local authorities having jurisdiction."

Field-installed accessories to certified equipment are provided with suitable markings and/or instructions detailing proper installation or assembly of the accessory with either a specific or generic certified equipment specified in the markings or instructions.

MDCs are intended for fixed installation. Unless otherwise identified, MDCs are intended for indoor installation. MDCs intended for outdoor use are marked "Outdoor Use," "Raintight" or "Rainproof," or are provided with a NEMA environmental class rating.

MDCs are intended for installation subject to approval by the Authority Having Jurisdiction (AHJ). AHJs should also be consulted if installation requires structural loading considerations.

Information concerning field-wiring connections, mounting location, site preparation, installation clearances, etc., is marked on the MDC and/or is provided in detailed installation instructions accompanying each MDC.

Working space within an MDC is evaluated as part of the equipment investigation. Access and working space around electrical equipment that is accessible from the outside of the MDC (such as an outward-facing panelboard or field-wiring compartment) is intended to comply with the applicable requirements in 110.26 of the NEC after the installation of one or more MDCs at a site.

The installation and arrangement of one or more MDCs at a site should not interfere with exits provided in the MDC.

MDCs often require special installation, such as a separate transformer, special grounding methods, motor-generator equipment, external chillers, etc. Such features, if required, are covered in the manufacturer's installation instructions.

MDC systems consisting of the main MDC enclosure housing the ITE and one or more accessory enclosures for power, cooling, etc., are investigated as a system and are identified as such in the individual certifications. The relationship and interconnections between the parts of the system are clearly identified in the manufacturer's installation instructions. Interconnecting power, signaling and communications wire and cable not investigated as part of an MDC system is intended to be installed in accordance with the applicable provisions of the NEC. The accessory equipment is marked with a reference to, and the identification of, the equipment with which it is intended to be used.

FIRE-RESISTANCE RATINGS

A fire-resistance rating for the MDC enclosure is not required but may be provided. When provided, all parts of the outer enclosure are rated based on testing as a nonbearing wall in accordance with ANSI/UL 263, "Fire Tests of Building Construction and Materials." The rating, if provided, is included in the individual certifications.

WIRING DIAGRAMS

The proper method of electrical installation (number of branch circuits, control wiring connections, etc.) is shown on the wiring diagram and/or marking attached to the equipment.

FACTORS NOT INVESTIGATED

Other features that may affect the operation or performance of the installed equipment have not been investigated.

Mechanical structures that may be part of the final installation such as ramps, ladders, stairs, platforms and the like have not been investigated.

RELATED PRODUCTS

The installation of electrical systems in commercial or industrial prefabricated buildings and units is covered under Commercial and Industrial Prefabricated Buildings and Units (QRXA).

Information processing equipment including equipment investigated for installation in information technology equipment (computer) rooms as defined in ANSI/NFPA 75, "Fire Protection of Information Technology Equipment," and Article 645 of the NEC is covered under Information Technology Equipment Including Electrical Business Equipment (NWGQ).

External chillers and other cooling systems that are not part of a modular data center are covered under Heating and Cooling Equipment (LZFE).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2755, "Outline of Investigation for Modular Data Centers."

The basic standard used to investigate individual ITE used in MDCs in this category is ANSI/UL 60950-1, "Information Technology Equipment – Safety – Part 1: General Requirements."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Modular Data Center."

The Listing Mark for field-installed accessories or other accessory equipment covered under this category includes the word "Accessory" (e.g., "Modular Data Center Accessory").

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MOTOR-GENERATOR SETS (PQYW)

USE

This category covers indoor-use motor-generator sets and frequency converters intended for use in accordance with ANSI/NFPA 70, "National Electrical Code."

RELATED PRODUCTS

This category does not cover electrical-generating equipment driven by gasoline, LP-gas, or diesel-fueled internal-combustion engines. These products are covered under Engine Generators (FTSR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 508, "Industrial Control Equipment," ANSI/UL 1004-1, "Rotating Electrical Machines – General Requirements," and UL 1248, "Engine-Generator Assemblies for Use in Recreational Vehicles."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Motor-Generator Set" or "Flywheel Energy Storage System," or other appropriate product name as shown in the individual Listings.

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MOTORS (PRGY)

USE

This category covers three-phase motors:

- intended to be field installed in accordance with Article 430 of ANSI/NFPA 70, "National Electrical Code" (NEC),
- 5 hp and larger,
- classified as NEMA Medium or NEMA Large as defined in NEMA MG-1, "Motors and Generators,"
- where the motor overtemperature protection required by Part III of Article 430 of the NEC is intended to be provided by a separate overload device or control.

INSTALLATION

All motors are provided with installation information that indicates the proper methods to secure the motor and electrically connect the motor to

the power source. The instructions also provide information concerning the type of load the motor can operate and, if needed, the type of protection.

An enclosed-type motor is not intended to be installed in an enclosure unless a marking on the motor, the installation instructions or a stuffer sheet provided with the motor states that the motor may be enclosed. Specifications for the enclosure are included with the instructions or marking.

When conduit hubs are not provided for a Type 2, 3, 3R, 3S or 5 enclosure, the enclosure, the instruction sheet provided with the enclosure, or the packaging carton is marked to indicate raintight or wet-location hubs that comply with the requirements in ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings," are intended to be used.

A separable conduit hub and a closure fitting is marked with the manufacturer's name or trademark and the catalog number or equivalent. Such a hub or fitting may be shipped separately, and any gasket, hardware, and instructions necessary for installation is shipped with the fitting or packaged with the enclosure.

An enclosure marked Type 4, 4X, 6 or 6P is provided with instructions for use of the watertight connection if the connection is not mounted on the enclosure.

Installation instructions are provided with an enclosure intended for field assembly of the bonding means that identifies the parts for bonding and specifies the method of installation.

Instructions are provided with the enclosure indicating that when installed in a Type 2 or 3R environment, the drain hole plug is intended to be removed.

PRODUCT MARKINGS

An enclosed-type motor has the Enclosure Type designation marked on the motor for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

All motors are intended for use in a 40°C (104°F) ambient unless marked for a different ambient.

These motors are marked with:

- the manufacturer's name or identification,
- the motor catalog or model number,
- the rated voltage,
- the full-load amperes, watts or kilowatts, or both,
- the rated speed,
- the rated horsepower or output wattage,
- the rated temperature rise or the insulation system class,
- the rated ambient temperature,
- the rated frequency, expressed in one of the following terms: hertz; Hz; ac-dc (frequency in Hz)/dc (e.g., 60/dc); ac only; direct current,
- the number of phases.
- A continuous-duty motor is marked "Continuous" (or "CONT").
- A direct-current motor is marked to indicate the winding type: straight shunt, stabilized shunt, compound or series.
- A multi-speed motor is marked with the amperes and horsepower at each speed.

These motors are marked to indicate the temperature rating (e.g., 60°C only, 60/75, or 75°C only) of the field-installed conductors for which the equipment has been investigated.

A motor manufactured at more than one factory is marked to uniquely identify the factory of manufacture.

Motors equipped with electrically-powered condensation prevention heaters are marked with the rated heater voltage, number of phases, and the rated power in watts.

Air-over motors are marked "Air Over" (or "AO") or "Air-Over Motor" (or "AOM").

An alternating-current motor is marked with a code letter to indicate the locked-rotor amperes in accordance with the NEC.

A wound-rotor induction motor is marked with the secondary volts and full-load amperes.

A motor rated for short-time or intermittent duty is marked on the nameplate with the words "intermittent duty" (or "int. duty") and with the time rating in minutes or hours, or a combination of minutes and hours. The rating may be for "On" time only or include specifications for both "On" and "Off" periods.

If the acceptability of a Type 2 or 3R enclosure is dependent upon a particular mounting orientation, the enclosure is marked to indicate the required orientation.

A cast-metal enclosure marked Type 3, 3R, or 3S is marked to indicate that, after determining the mounting position of the enclosure, any holes drilled in the field are intended to be located in the lowest part of the bottom wall.

Exception: If a manufacturer intends that a cast-metal enclosure be acceptable for field drilling and tapping of holes for conduit connections, the enclosure is marked to indicate the location and trade sizes of conduit for which the enclosure has been found to be acceptable. If counter-boring is necessary to accommodate certain sizes of conduit, such information is also given.

Note: The instructions for drilling and tapping may be provided on an instruction sheet provided with the enclosure or marked on the packaging carton.

MOTORS (PRGY)

Any environmental-type enclosure intended for use with conduit hubs, and/or other field-installed equipment, but shipped from the factory without them, is marked or provided with instructions that identify the type of equipment intended to be used to maintain the environmental integrity of the enclosure. This may be accomplished by identifying the necessary environmental type designation or by identifying the specific manufacturer and model number of the field-installed equipment.

RELATED PRODUCTS

Motors intended for use in hazardous (classified) locations are covered under Motors for Use in Hazardous Locations (PTDR), Motors, Specialty for Use in Hazardous Locations (PUCJ), and Motors, Division 2 for Use in Hazardous Locations (PTHE).

Motors incomplete in construction and intended for factory installation are covered under Motors (PRGY2).

Products Verified for energy efficiency are covered under Electric Motors Verified for Energy Efficiency (ZWKG).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1004-1, "Rotating Electrical Machines – General Requirements."

Where indicated in the individual certifications, the spacings provided within these motors have additionally been investigated to ANSI/UL 840, "Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Motor."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTORS, INVERTER DUTY (PRHJ)

USE

This category covers squirrel cage, polyphase induction motors intended for use with variable voltage and variable frequency controls (commonly referred to as inverters) that are:

1. three-phase,
2. intended to be field installed in accordance with Article 430 of ANSI/NFPA 70, "National Electrical Code" (NEC),
3. 5 hp and larger,
4. classified as NEMA Medium or NEMA Large as defined in NEMA MG-1, "Motors and Generators," and
5. where the motor overtemperature protection required by Part III of Article 430 of the NEC is intended to be provided by a separate overload device or control.

The requirements for this category are intended to investigate the suitability of the motor for normal use when fed from an inverter supply through a manufacturer-declared range of operating conditions.

This category does not cover:

1. the efficacy of motor-temperature protection under abnormal conditions,
2. the operation of a motor under unusual service conditions as described in Part 31 of NEMA MG-1, nor
3. the operation of a motor in hazardous (classified) locations.

Though the motors covered under this category may be provided with Recognized overtemperature protection, the suitability of the overtemperature protection has not been investigated and must be determined in the end-use application.

INSTALLATION

All motors are provided with installation information that indicates the proper methods to secure the motor and electrically connect the motor to the power source. The instructions also provide information concerning the type of load the motor can operate and, if needed, the type of protection.

An enclosed-type motor is not intended to be installed in an enclosure unless a marking on the motor, the installation instructions, or a stuffer sheet provided with the motor states that the motor may be enclosed. Specifications for the enclosure are included with the instructions or marking.

When conduit hubs are not provided for a Type 2, 3, 3R, 3S or 5 enclosure, the enclosure, the instruction sheet provided with the enclosure, or the packaging carton is marked to indicate that raintight or wet-location hubs complying with the requirements in ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings," are intended to be used.

MOTORS, INVERTER DUTY (PRHJ)

309

A separable conduit hub and a closure fitting is marked with the manufacturer's name or trademark and the catalog number or equivalent. Such a hub or fitting may be shipped separately, and any gasket, hardware, and instructions necessary for installation is shipped with the fitting or packaged with the enclosure.

An enclosure marked Type 4, 4X, 6 or 6P is provided with instructions for use of the watertight connection if the connection is not mounted on the enclosure.

Installation instructions are provided with an enclosure intended for field assembly of the bonding means that identify the parts for bonding and specify the method of installation.

Instructions are provided with the enclosure indicating that when installed in a Type 2 or 3R environment, the drain hole plug is intended to be removed.

PRODUCT MARKINGS

An enclosed-type motor has the Enclosure Type designation marked on the motor for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

All motors are intended for use in a 40°C (104°F) ambient unless marked for a different ambient.

These motors are marked with:

1. the manufacturer's name or identification,
2. the motor catalog or model number,
3. the rated voltage,
4. the full-load amperes, watts or kilowatts, or both,
5. the rated speed,
6. the rated horsepower or output wattage,
7. the rated temperature rise or the insulation system class,
8. the rated ambient temperature,
9. the rated frequency, expressed in one of the following terms: hertz (or Hz); ac-dc (frequency in Hz)/dc (e.g., 60/dc); ac only; direct current, and
10. the number of phases.
11. A continuous-duty motor is marked "Continuous" (or "CONT").
12. A direct-current motor is marked to indicate the winding type: straight shunt, stabilized shunt, compound or series.
13. A multi-speed motor is marked with the amperes and horsepower at each speed.

These motors are marked to indicate the temperature rating (e.g., 60°C only, 60/75, or 75°C only) of the field-installed conductors for which the equipment has been investigated.

Motors equipped with electrically-powered, condensation-prevention heaters are marked with the rated heater voltage, number of phases, and the rated power in watts.

Air-over motors are marked "Air Over" (or "AO") or "Air-Over Motor" (or "AOM").

An alternating-current motor is marked with a code letter to indicate the locked-rotor amperes in accordance with the NEC.

A wound-rotor induction motor is marked with the secondary volts and full-load amperes.

A motor rated for short-time or intermittent duty is marked on the nameplate with the words "intermittent duty" (or "int. duty") and with the time rating in minutes or hours, or a combination of minutes and hours. The rating may be for "On" time only or include specifications for both "On" and "Off" periods.

If the acceptability of a Type 2 or 3R enclosure is dependent upon a particular mounting orientation, the enclosure is marked to indicate the required orientation.

A cast-metal enclosure marked Type 3, 3R or 3S is marked to indicate that, after determining the mounting position of the enclosure, any holes drilled in the field are intended to be located in the lowest part of the bottom wall.

Exception: If a manufacturer intends that a cast-metal enclosure be acceptable for field drilling and tapping of holes for conduit connections, the enclosure is marked to indicate the location and trade sizes of conduit for which the enclosure has been found to be acceptable. If counter-boring is necessary to accommodate certain sizes of conduit, such information is also given.

Note: The instructions for drilling and tapping may be provided on an instruction sheet provided with the enclosure or marked on the packaging carton.

Any environmental-type enclosure intended for use with conduit hubs and/or other field-installed equipment, but shipped from the factory without them, is marked or provided with instructions that identify the type of equipment intended to be used to maintain the environmental integrity of the enclosure. This may be accomplished by identifying the necessary environmental type designation or by identifying the specific manufacturer and model number of the field-installed equipment.

RELATED PRODUCTS

Motors intended for use in hazardous (classified) locations are covered under Motors for Use in Hazardous Locations (PTDR), Motors, Specialty for Use in Hazardous Locations (PUCJ), and Motors, Division 2 for Use in Hazardous Locations (PTHE).

Motors incomplete in construction and intended for factory installation are covered under Motors (PRGY2).

Motors Verified for energy efficiency are covered under Electric Motors Verified for Energy Efficiency (ZWKG).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1004-1, "Rotating Electrical Machines - General Requirements," and ANSI/UL 1004-8, "Inverter Duty Motors."

Where indicated in the individual certifications, the spacings provided within these motors have additionally been investigated to ANSI/UL 840, "Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Inverter-duty Motor."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SERVO AND STEPPER MOTORS (PRHZ)

USE

This category covers:

servo motors, defined as motors specially designed and built, having a high speed of response and designed for use in feedback control systems (servomechanisms), typically for precision positioning, and **stepper motors**, defined as brushless, synchronous electric motors that can divide a full rotation into a large number of steps.

These motors are intended to be field installed in accordance with Article 430 of ANSI/NFPA 70, "National Electrical Code."

This category covers the suitability of the motor for normal use when fed from an appropriate controller (drive) through its manufacturer-declared normal operating region.

This category does not cover the efficacy of motor overtemperature protection under normal or abnormal conditions, or the operation of a motor in hazardous (classified) locations.

Though these motors may be provided with overtemperature protection, the suitability of the overtemperature protection has not been investigated.

INSTALLATION

All motors are provided with installation information that indicates the proper methods to secure the motor and electrically connect the motor to the power source. The instructions also provide information concerning the type of load the motor can operate and, if needed, the type of protection.

An enclosed-type motor is not intended to be installed in an enclosure unless a marking on the motor, the installation instructions, or a stuffer sheet provided with the motor states that the motor may be enclosed. Specifications for the enclosure are included with the instructions or marking.

When conduit hubs are not provided for a Type 2, 3, 3R, 3S or 5 enclosure, the enclosure, the instruction sheet provided with the enclosure, or the packaging carton is marked to indicate that raintight or wet-location hubs complying with the requirements in ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings," are intended to be used.

A separable conduit hub and a closure fitting is marked with the manufacturer's name or trademark and the catalog number or equivalent. Such a hub or fitting may be shipped separately, and any gasket, hardware, and instructions necessary for installation is shipped with the fitting or packaged with the enclosure.

An enclosure marked Type 4, 4X, 6 or 6P is provided with instructions for use of the watertight connection if the connection is not mounted on the enclosure.

Installation instructions are provided with an enclosure intended for field assembly of the bonding means that identify the parts for bonding and specify the method of installation.

Instructions are provided with the enclosure indicating that when installed in a Type 2 or 3R environment, the drain hole plug is intended to be removed.

PRODUCT MARKINGS

All motors are intended for use in a 40°C (104°F) ambient unless marked for a different ambient.

All motors covered under this category are marked with:

1. the manufacturer's name or identification,

2. the motor catalog or model number,
3. the rated voltage,
4. the full-load amperes, watts or kilowatts, or both,
5. the rated speed,
6. the rated horsepower or output wattage,
7. the rated temperature rise or the insulation system class, and
8. the rated ambient temperature.

Servo motors are additionally marked with:

1. the continuous stall current,
2. the maximum rotational speed, and
3. the words "Servo Motor."

Stepper motors are additionally marked with:

1. the holding torque,
2. the maximum rotational speed, and
3. the words "Stepper Motor."

RELATED PRODUCTS

Electronically protected motors are covered under Electronically Protected Motors (XDNW2).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1004-1, "Rotating Electrical Machines - General Requirements," and ANSI/UL 1004-6, "Servo and Stepper Motors."

Where indicated in the individual Listings, the spacings provided within these motors have additionally been investigated to ANSI/UL 840, "Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Servo Motor" or "Stepper Motor."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTORS AND GENERATORS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (PRSN)

MOTORS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (PRZA)

USE

This category covers motors.

The Certification Mark on a motor applies to the motor, but not to any equipment driving or driven by the motor. In the case of a motor-generator set provided with a common base, the motor and generator each will bear its respective Certification Mark.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard use to investigate products in this category is ANSI/UL 1004-1, "Rotating Electrical Machines - General Requirements."

The hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Motor for Use in Class I, Zone 0, 1 and 2 Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTORS, SPECIALTY FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (PRZM)

USE AND INSTALLATION

This category covers specialty motors.

These motors are intended for installation and operation in accordance with the instructions provided for each motor by the manufacturer. These motors may require any or all of the following for proper operation: (1) special controllers, (2) special control circuitry, (3) atypical input voltage waveform, (4) atypical input current waveform. Refer to the operating instructions. These motors are not intended for across-the-line operation.

Unless otherwise marked, these motors are intended for use in ambient temperatures within the range of -20°C (-4°F) to +40°C (+104°F).

The Certification Mark on a specialty motor applies to the motor, but not any equipment driving or driven by the motor.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 1004-1, "Rotating Electrical Machines - General Requirements."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Specialty Motor for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTORS AND GENERATORS FOR USE IN HAZARDOUS LOCATIONS (PSBV)

GENERATORS FOR USE IN HAZARDOUS LOCATIONS (PSPT)

GENERAL

This category covers generators for use in Class I, Groups C and D; Class II, Groups E, F and G hazardous locations.

Unless otherwise marked, generators for use in Class I and Class II hazardous locations are intended for use in ambient temperature within the range of -25°C (-13°F) to +40°C (+104°F).

The Certification Mark on a generator applies to the generator, but not to any equipment driving or driven by the generator. In the case of a motor generator set provided with a common base, the motor and generator will each bear its respective Certification Mark.

RELATED PRODUCTS

For rebuilt generators see Motors and Generators, Rebuilt for Use in Hazardous Locations (PTKQ).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Generator for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Generators for Use in Hazardous Locations (PSPT)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTORS FOR USE IN HAZARDOUS LOCATIONS (PTDR)

GENERAL

This category covers motors for use in Class I, Groups B, C and D; Class II, Groups E, F and G hazardous locations.

Unless otherwise marked, motors for use in Class I and Class II hazardous locations are intended for use in ambient temperatures within the range of -25°C (-13°F) to +40°C (+104°F).

The Certification Mark on a motor applies to the motor, but not to any equipment driving or driven by the motor. In the case of a motor generator set provided with a common base, the motor and generator each will bear its respective Certification Mark.

Some motors are provided with Recognized inherent overheating protective devices.

RELATED PRODUCTS

For rebuilt motors, see Motors and Generators, Rebuilt for Use in Hazardous Locations (PTKQ).

Products Verified for energy efficiency are covered under Electric Motors for Use in Hazardous Locations Verified for Energy Efficiency (ZWKL).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Motor for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTORS, DIVISION 2 FOR USE IN HAZARDOUS LOCATIONS (PTHE)

GENERAL

This category covers electric motors for use in Class I, Division 2, Groups A, B, C and D, and Class II, Division 2, Groups F and G hazardous (classified) locations.

For Class I, Division 2 locations, the enclosure may be of the open or totally enclosed type. The Group designation is marked unless the motor is acceptable for Groups A, B, C and D. The motor is also marked with the operating-temperature code designating the maximum internal or external surface temperature determined at rated full-load steady-state conditions, if the temperature is greater than 100°C. If the enclosure incorporates one or more arcing or sparking parts, the part is housed in a Class I, Division 1 enclosure or the part is within a hermetically sealed enclosure, constructed with current interrupting contacts immersed in oil, located in a nonincendive circuit, or located in a purged and pressurized enclosure. If the motor is provided with an internal space heater, the space heater is intended to be wired in the control circuit such that the space heater is energized when the motor is de-energized, and vice versa. The maximum surface temperature of the space heater is marked on the motor, if the temperature exceeds 80% of the operating temperature of the motor.

For Class II, Division 2 locations, the enclosure is of the totally enclosed type. The motor is marked with the operating temperature or operating-temperature code designating the maximum full-load external temperature determined at rated full-load steady-state conditions when operating in free air (not dust blanketed), if the external temperature is greater than 100°C.

RELATED PRODUCTS

For Division 1 motors, see Motors for Use in Hazardous Locations (PTDR).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

PRODUCT CATEGORIES BY CATEGORY CODE

MOTORS AND GENERATORS FOR USE IN HAZARDOUS LOCATIONS (PSBV)

Motors, Division 2 for Use in Hazardous Locations (PTHE)–Continued

The basic requirements used to investigate products in this category are contained in UL Subject 1836, "Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2 and Class II, Division 2 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Motor for Division 2 Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTORS AND GENERATORS, REBUILT FOR USE IN HAZARDOUS LOCATIONS (PTKQ)

USE

This category covers rebuilt motors and generators for use in Class I, Groups B, C and D, and Class II, Groups E, F and G hazardous locations.

Unless otherwise marked, rebuilt motors and generators for use in Class I and Class II hazardous locations are intended for use in ambient temperatures within the range of -25°C (-13°F) to +40°C (+104°F).

The Certification Mark on a rebuilt motor or generator applies to the motor or generator, but not to any equipment driven by or driving the motor or generator. In the case of a rebuilt motor-generator set provided with a common base, the motor and generator will each bear its respective Certification Mark.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Rebuilt Electric Motor for Hazardous Locations" or "Rebuilt Electric Generator for Hazardous Locations."

The Listing Mark on a rebuilt motor or generator applies to the motor or generator, but not to any equipment driven by or driving the motor or generator. In the case of a rebuilt motor-generator set provided with a common base, the motor and generator will each bear its respective Listing Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOTORS, SPECIALTY FOR USE IN HAZARDOUS LOCATIONS (PUCJ)

USE AND INSTALLATION

This category covers specialty motors for use in Class I, Groups B, C and D; Class II, Groups E, F and G hazardous (classified) locations.

These motors are intended for installation and operation in accordance with the instructions provided for each motor by the manufacturer. These motors may require any or all of the following for proper operation: (1) special controllers, (2) special control circuitry, (3) atypical input voltage waveform, (4) atypical input current waveform. Refer to the operating instructions. These motors are not intended for across-the-line operation.

Unless otherwise marked, these motors are intended for use in ambient temperatures within the range of -25°C (-13°F) to +40°C (+104°F).

The Certification Mark on a specialty motor applies to the motor, but not any equipment driving or driven by the motor.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

MOTORS AND GENERATORS FOR USE IN HAZARDOUS LOCATIONS (PSBV)

Motors, Specialty for Use in Hazardous Locations (PUCJ)–Continued

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Specialty Motor for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MOUNTING POSTS AND PEDESTALS FOR DISTRIBUTION EQUIPMENT

(PUPR)

GENERAL

This category covers mounting posts and pedestals rated 600 V ac or less. They are intended to serve as a raceway for underground wiring that is being brought above grade to feed an outdoor electrical distribution device, such as a power outlet, panelboard, meter socket, circuit breaker enclosure or the like. They are intended to support the distribution device, which is installed either in the factory or in the field. They may contain electrical termination points for underground wiring and for wiring to the distribution device.

USE AND INSTALLATION

A mounting post is intended to be mounted in concrete at grade level or below, or is intended to be secured to some other mounting support.

A mounting pedestal is intended to be mounted to a concrete slab.

A mounting post or pedestal either has ventilation to inhibit condensation or is provided with instructions indicating the correct mounting procedure.

Unless marked otherwise, a mounting post or pedestal is intended to be self-supporting and is not intended to serve as the support of a mast for overhead wiring.

Investigation of posts and pedestals include a test designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

PRODUCT MARKINGS

Mounting posts and pedestals are marked to indicate the electrical distribution unit(s) with which they are intended to be used.

A mounting post is marked with a grade level line to which the post is intended to be encased.

Posts and pedestals are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location.

Unless the equipment is marked with both the size and temperature rating of wire to be used, the termination provisions on equipment are based on the use of 60°C wire ampacities for wire sizes 14-1 AWG, and 75°C wire ampacities for wire sizes 1/0 AWG and larger.

RELATED PRODUCTS

Termination boxes are covered under Termination Boxes (XCKT).

Equipment connected only by busbars to both input and output circuits and equipment known as "end cable tap boxes" are covered under Busways and Associated Fittings (CWFT).

Equipment containing switching devices, relays or overcurrent devices is covered under the appropriate category; see Switchboards, Dead-front (WEVZ), Industrial Control Panels (NITW) or Panelboards (QEUY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1773, "Termination Boxes."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Mounting Post and Pedestal."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MULTIOUTLET ASSEMBLIES (PVG T)

GENERAL

This category covers multioutlet assemblies, accessories for use with multioutlet assemblies, and factory-assembled wiring kits intended for installation into multioutlet assemblies.

Multioutlet assemblies consist of an enclosure or raceway and outlet wiring devices that provide power for connection of utilization equipment. Multioutlet assemblies are intended for use in dry locations, other than hazardous (classified) locations, in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). Multioutlet assemblies are intended to be connected to permanently installed branch circuits operating at frequencies between 50 and 400 Hz and dc (direct current) circuits.

A multioutlet assembly may be provided with channels for additional power circuits, control circuits, power-limited circuits and communication-circuit wiring for audio, video and data.

Accessories are parts that may be added to a multioutlet assembly either by the manufacturer or by the installer to add functionality, e.g., hangers, retainers, luminaires, remote-control modules, signs.

Wiring kits are assemblies of conductors and devices, such as receptacle outlets, switches, etc., that are supplied as a wiring system for use in specific multioutlet assemblies.

A part used to connect, change direction, or terminate a multioutlet assembly (e.g., a transition coupler, an end cap, a corner, a tee, an adapter, a box) or a specific wiring device that completes the system is covered under Multioutlet Assembly Fittings (PVUR).

USE AND INSTALLATION

Multioutlet assemblies have not been investigated for use in general patient care areas or critical patient care areas of health care facilities as defined in Article 517 of the NEC.

Multioutlet assemblies are intended for installation in accordance with Article 380 of the NEC.

Instructions for Multioutlet Assemblies Investigated to UL Subject 111, "Outline of Investigation for Multioutlet Assemblies"

When installation instructions are not provided with the multioutlet assembly, the multioutlet assembly is marked with the following or equivalent: "Installation and operation instructions for model ___ are available at http://www.____.com/___/." The blanks are filled in with the model number and URL address where the actual instructions can be viewed, downloaded and/or printed.

A multioutlet assembly intended to be mounted on or into a work surface is investigated for use with one of the following specific types of work surfaces:

1. Dry-use work surface (e.g., office desk, table)
2. A work surface located directly adjacent to a lavatory or other water source (e.g., counter adjacent to a kitchen sink)

Hardware, accessories and fittings are provided with the multioutlet assembly or are specified in the instructions.

Instructions for the installation of accessories and wiring kits indicate the specific multioutlet assemblies for which they are intended to be used. Instructions are provided on or with the accessory or wiring kit.

PRODUCT MARKINGS

Specific Product Markings for Multioutlet Assemblies Investigated to ANSI/UL 5, "Surface Metal Raceways and Fittings," and ANSI/UL 5A, "Nonmetallic Surface Raceways and Fittings"

Separate channels may be provided in multioutlet assemblies where the product is marked to indicate the number, type and size of additional conductors that may be field installed.

Specific Product Markings for Multioutlet Assemblies Investigated to UL Subject 111

Multioutlet Assemblies Investigated to UL Subject 111

Multioutlet assemblies investigated to UL Subject 111 are marked with one of the following Type markings:

Type A — A multioutlet assembly that provides all the required parts and incorporates factory pre-wired power (mains) conductors to the wiring devices and accessories. The field-wiring connection consists of one of the following: conduit whip, armored cable, manufactured wiring system, office-furnishing wiring system, pigtail lead or terminal block, or is intended to terminate on installed device wiring terminals. Pre-wired communications wiring may be provided. No additional unwired raceways for power or communications conductors are provided. No field-wired accessories are provided for the system.

Type A1 — Identical to a Type A multioutlet assembly except additional unwired raceways for power and/or communications conductors may be provided, or accessories may be provided with the system but are not pre-wired or installed at the factory.

Type B — A multioutlet assembly that provides for the installation, routing and termination of the branch-circuit-conductor wiring within the multioutlet assembly in the field. Wiring devices, fittings and accessories are provided with the system but are not pre-wired and installed at the factory.

Type C — A multioutlet assembly that does not include factory-installed conductors, wiring devices or accessories, but has factory-provided openings for wiring devices or accessories. This type of multioutlet assembly is marked for use with the specific kit(s) that may be shipped with the multioutlet assembly or shipped separately from the multioutlet assembly for field installation.

A Type A1 or B multioutlet assembly provided with a raceway for field-installed conductors is marked "Field-wiring Raceway" or an equivalent statement on the cover or inside wall of the raceway. These assemblies are also marked, on their base or cover and in the installation instructions, with the number, type and size of insulated conductors for which the multioutlet assembly was investigated.

A wiring compartment of a multioutlet assembly intended for use only with Class 2 circuits is marked "For Class 2 Circuits Only."

A multioutlet assembly and component parts that are disassembled for shipment are marked to associate the separable parts. The following or equivalent statement is provided on the parts: "Multioutlet assembly part ___ for use with ___." The marking may be on the part or on the smallest unit container of parts.

Accessories

An electrical accessory that is a load on a circuit is marked with its electrical rating.

An accessory intended for installation on a suspended multioutlet assembly is marked with the weight of the accessory.

Wiring Kits

A wiring kit is marked with a flag label attached to the conductor(s) with a distinctive catalog number or the equivalent.

RELATED PRODUCTS

Raceway assemblies that incorporate ground-fault circuit interrupter receptacles and no other outlets are covered under Ground-fault Circuit Interrupters (KCXS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 5, "Surface Metal Raceways and Fittings," and ANSI/UL 5A, "Nonmetallic Surface Raceways and Fittings," or the requirements contained in UL Subject 111, "Outline of Investigation for Multioutlet Assemblies."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Multioutlet Assembly," "Multioutlet Assembly Accessory" or "Multioutlet Assembly Wiring Kit."

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MULTIOUTLET ASSEMBLY FITTINGS (PVUR)

USE AND INSTALLATION

This category covers multioutlet assembly fittings used to connect, change direction, or terminate a multioutlet assembly (e.g., a transition coupler, an end cap, a corner, a tee, an adapter, a box) or which are specific wiring devices that complete the system.

Multioutlet assembly fittings are intended for installation in accordance with Article 380 of ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Multioutlet Assemblies (PVG T) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 5, "Surface Metal Raceways and Fittings," and ANSI/UL 5A, "Nonmetallic Surface Raceways and Fittings," or the requirements contained in UL Subject 111, "Outline of Investigation for Multioutlet Assemblies."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service.

Multioutlet Assembly Fittings (PVUR)—*Continued*

The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Multi-Outlet Assembly Fitting," "Elbow" or "End Fitting," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MULTI-POINT INTERCONNECTION POWER CABLE ASSEMBLIES FOR INDUSTRIAL MACHINERY (PVVA)

GENERAL

This category covers multi-point interconnection power cable assemblies intended for use in an industrial environment to distribute power to branch circuits, including motor branch circuits, of industrial machinery. The assemblies may consist of power cable assemblies, male and female power cable fittings, panel-mounted power cable/conductor fittings and feeder-tap power cable fittings used with industrial machinery in accordance with ANSI/NFPA 79, "Electrical Standard for Industrial Machinery."

This category does not cover male-to-male cable assemblies or multi-outlet fittings.

Product Types

The following products are covered under this category:

Power Cable Assemblies — These assemblies consist of a length of flexible cord or cable with a molded-on or assembled-on male or female power cable fitting on at least one end of the cable.

Male and Female Power Cable Fittings — These fittings are intended to be field-wired onto flexible cord or cable with either a male or female insert. The diameter and the wire size of the flexible cord or cable to which the fitting is intended to be assembled is marked on the individual fitting or on the smallest unit shipping container.

Panel-mounted Power Cable/Conductor Fittings — These fittings consist of a panel-mounted assembly with either a male or female insert. Each assembly is provided with a means to secure to an enclosure of the industrial machinery.

Feeder-tap Power Cable Fittings — These fittings are intended for feed-through termination to tray cable or other appropriate cable, together with either a female interconnection device to terminate to a cable assembly or to connect to flexible cord or cable suitable for hard use, that is the same size and ampacity as the feeder cable.

SPECIAL CONSIDERATIONS

The power cable assemblies and mating fittings are not intended to be used as a substitute for the fixed wiring of the building structure. The power cable assemblies and mating fittings may be connected to the fixed wiring of the building structure, using a feeder-tap fitting or male/female cable fittings.

These devices are intended for use only with the Listee's same line of products covered under this category.

Power cable assemblies and fittings covered under this category are not intended to make or interrupt current under load conditions.

These devices are intended for indoor use only, unless otherwise so identified.

RATINGS

These power cable assemblies are rated 600 V or less. Each power cable assembly and fitting is rated in volts and amperes. The electrical ratings are marked on each device or on a flag label affixed to each individual power cable assembly.

These power cable assemblies and fittings have been investigated for their marked short-circuit current rating. Power cable assemblies and fittings may specify a maximum ampere rating, type of overcurrent protective device, or both. Unless otherwise marked, the power cable assemblies and fittings are intended to be supplied from an overcurrent protective device of the maximum ampere rating permitted by Table 7.2.10.4 of ANSI/NFPA 79.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2237, "Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to

identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Multi-point Interconnection Assembly," "Power Cable Assembly for Industrial Machinery" or "Power Cable Fitting for Industrial Machinery."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MULTI-POINT INTERCONNECTION POWER CABLE ASSEMBLIES FOR INDUSTRIAL MACHINERY FOR USE IN HAZARDOUS LOCATIONS (PVVJ)

GENERAL

This category covers multi-point interconnection power cable assemblies intended for use in industrial establishments with restricted public access in locations that are classified as a Class I, Division 2 location. The assemblies may consist of power cable assemblies, power cable plugs and sockets, and panel-mounted power cable/conductor plugs and sockets used for interconnection

between one piece of electrical equipment and another piece of electrical equipment (by means of a cable or cord assembly involving plugs and sockets on both ends, or a plug and socket on one end and unterminated cable or cord on the other), or

between premises wiring and a piece of electrical equipment (by means of a cable or cord assembly involving a socket on the equipment end and unterminated cable or cord on the premises wiring end).

This interconnection is in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), and ANSI/NFPA 79, "Electrical Standard for Industrial Machinery."

Each cable assembly is provided with means to mechanically secure the plug or socket on either end of the cable assembly to the intended equipment plug or socket. The means used to provide this mechanical securement is constructed as follows:

1. separation shall be possible only with the aid of a tool,
2. when not secured, the means shall be captive to the cable assembly, and
3. a marking is provided that is likely to be readily visible after installation that reads, "WARNING - Do Not Connect or Disconnect When Energized," or equivalent.

Note: The warning marking may be on the securement means or on the cable assembly. It may be necessary to provide more than one warning marking for ready visibility.

Instructions are provided indicating that, should the cable assembly become separated from the intended equipment plug or socket, the part that remains energized is a socket outlet.

This category does not cover cable assemblies with plugs on both ends, but does cover cable assemblies with multiple sockets.

Product Types

The following products are covered under this category:

Power Cable Assemblies — These assemblies consist of a length of cord or cable as follows:

1. extra-hard-usage cord,
2. instrumentation tray cable (Type ITC) for applications involving instrumentation and control circuits, or
3. power-limited tray cable (Type PLTC) for applications involving remote-control, signaling, and power-limited circuits.

Note: See the following Code references for additional details on these wiring methods:

For extra-hard-usage cord, see Article 400 of the NEC.

For instrumentation tray cable (Type ITC), see Article 727 of the NEC.

For power-limited tray cable (Type PLTC), see Article 725 of the NEC.

The cord or cable is terminated on at least one end with a molded-on or assembled-on plug or socket.

Power Cable Plugs and Sockets — These plugs and sockets are intended to be field wired or molded onto cord or cable as indicated under **Power Cable Assemblies** above, with either a male or female insert. The diameter and the wire size of the field-wired cord or cable to which the plug or socket is intended to be assembled is indicated on the plug or socket, or the smallest unit shipping container.

MULTI-POINT INTERCONNECTION POWER CABLE ASSEMBLIES FOR INDUSTRIAL MACHINERY FOR USE IN HAZARDOUS LOCATIONS (PVVJ)

Panel-mounted Power Cable/Conductor Plugs and Sockets — These plugs and sockets consist of a panel-mounted assembly with either a plug or socket. Each assembly is provided with a means to secure to an enclosure of the industrial machinery.

RATINGS

These power cable assemblies are rated based on the involved cord or cable as follows:

1. extra-hard-usage cord for applications involving circuits operating at 600 V or less and 60 A or less,
2. instrumentation tray cable (Type ITC) for applications involving instrumentation and control circuits operating at 150 V or less and 5 A or less, or
3. power-limited tray cable (Type PLTC) for applications involving remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power source.

Each power cable assembly and plug and socket is rated in volts and amperes. The electrical ratings are marked on each device or on a flag label affixed to each individual power cable assembly.

These power cable assemblies and plugs and sockets have been investigated for their marked short-circuit-current rating. Power cable assemblies and plugs and sockets may specify a maximum ampere rating, type of overcurrent protective device, or both. Unless otherwise marked, the power cable assemblies and plugs and sockets are intended to be supplied from an overcurrent protective device of the maximum ampere rating permitted by Table 7.2.10.4 of ANSI/NFPA 79.

SPECIAL CONSIDERATIONS

The power cable assemblies and mating plugs and sockets are not intended to be used as a substitute for the fixed wiring methods required by 501.10 of the NEC.

These power cable assemblies and mating plugs and sockets are intended for use only with the Listee's same line of power cable assemblies and mating plugs and sockets covered under this category.

Power cable assemblies and plugs and sockets covered under this category are not intended to make or interrupt current under load conditions.

These devices are intended for indoor use only, unless otherwise so identified.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations requirements used to investigate products in this category are contained in UL Subject 2237, "Outline of Investigation for Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

Note: The unclassified locations use of the term "fitting" in UL Subject 2237 is equivalent to the hazardous (classified) locations use of the terms "plug" or "socket."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Multi-point Interconnection Assembly for Industrial Machinery for Use in Hazardous Locations," "Power Cable Assembly for Industrial Machinery for Use in Hazardous Locations," "Power Cable Plug for Industrial Machinery for Use in Hazardous Locations" or "Power Cable Socket for Industrial Machinery for Use in Hazardous Locations." The words "Hazardous Locations" may be abbreviated "Haz. Loc."

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MULTI-POINT INTERCONNECTION POWER CABLE ASSEMBLIES FOR INDUSTRIAL MACHINERY FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (PVVM)

GENERAL

MULTI-POINT INTERCONNECTION POWER CABLE ASSEMBLIES FOR INDUSTRIAL MACHINERY FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (PVVM)

This category covers multi-point interconnection power cable assemblies intended for use in industrial establishments with restricted public access in locations that are classified as a Class I, Zone 2 location. The assemblies may consist of power cable assemblies, power cable plugs and sockets, and panel-mounted power cable/conductor plugs and sockets used for interconnection

between one piece of electrical equipment and another piece of electrical equipment (by means of a cable or cord assembly involving plugs and sockets on both ends, or a plug and socket on one end and unterminated cable or cord on the other), or between premises wiring and a piece of electrical equipment (by means of a cable or cord assembly involving a socket on the equipment end and unterminated cable or cord on the premises wiring end).

This interconnection is in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), and ANSI/NFPA 79, "Electrical Standard for Industrial Machinery."

Each cable assembly is provided with means to mechanically secure the plug or socket on either end of the cable assembly to the intended equipment plug or socket. The means used to provide this mechanical securement is constructed as follows:

1. separation shall be possible only with the aid of a tool,
2. when not secured, the means shall be captive to the cable assembly, and
3. a marking is provided that is likely to be readily visible after installation that reads, "WARNING - Do Not Connect or Disconnect When Energized," or equivalent.

Note: The warning marking may be on the securement means or on the cable assembly. It may be necessary to provide more than one warning marking for ready visibility.

Instructions are provided indicating that, should the cable assembly become separated from the intended equipment plug or socket, the part that remains energized is a socket outlet.

This category does not cover cable assemblies with plugs on both ends, but does cover cable assemblies with multiple sockets.

Product Types

The following products are covered under this category:

Power Cable Assemblies — These assemblies consist of a length of cord or cable as follows:

1. extra-hard-usage cord,
2. instrumentation tray cable (Type ITC) for applications involving instrumentation and control circuits, or
3. power-limited tray cable (Type PLTC) for applications involving remote-control, signaling, and power-limited circuits.

Note: See the following Code references for additional details on these wiring methods:

- For extra-hard-usage cord, see Article 400 of the NEC.
- For instrumentation tray cable (Type ITC), see Article 727 of the NEC.
- For power-limited tray cable (Type PLTC), see Article 725 of the NEC.

The cord or cable is terminated on at least one end with a molded-on or assembled-on plug or socket.

Power Cable Plugs and Sockets — These plugs and sockets are intended to be field wired or molded onto cord or cable as indicated under **Power Cable Assemblies** above, with either a male or female insert. The diameter and the wire size of the field-wired cord or cable to which the plug or socket is intended to be assembled is indicated on the plug or socket, or the smallest unit shipping container.

Panel-mounted Power Cable/Conductor Plugs and Sockets — These plugs and sockets consist of a panel-mounted assembly with either a plug or socket. Each assembly is provided with a means to secure to an enclosure of the industrial machinery.

RATINGS

These power cable assemblies are rated based on the involved cord or cable as follows:

1. extra-hard-usage cord for applications involving circuits operating at 600 V or less and 60 A or less,
2. instrumentation tray cable (Type ITC) for applications involving instrumentation and control circuits operating at 150 V or less and 5 A or less, or
3. power-limited tray cable (Type PLTC) for applications involving remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power source.

Each power cable assembly and plug and socket is rated in volts and amperes. The electrical ratings are marked on each device or on a flag label affixed to each individual power cable assembly.

These power cable assemblies and plugs and sockets have been investigated for their marked short-circuit-current rating. Power cable assemblies and plugs and sockets may specify a maximum ampere rating, type of overcurrent protective device, or both. Unless otherwise marked, the power cable assemblies and plugs and sockets are intended to be supplied

MULTI-POINT INTERCONNECTION POWER CABLE ASSEMBLIES FOR INDUSTRIAL MACHINERY FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (PVVM)

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from an overcurrent protective device of the maximum ampere rating permitted by Table 7.2.10.4 of ANSI/NFPA 79.

SPECIAL CONSIDERATIONS

The power cable assemblies and mating plugs and sockets are not intended to be used as a substitute for the fixed wiring methods required by 505.15 of the NEC.

These power cable assemblies and mating plugs and sockets are intended for use only with the Listee's same line of power cable assemblies and mating plugs and sockets covered under this category.

Power cable assemblies and plugs and sockets covered under this category are not intended to make or interrupt current under load conditions.

These devices are intended for indoor use only, unless otherwise so identified.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations requirements used to investigate products in this category are contained in UL Subject 2237, "Outline of Investigation for Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

Note: The unclassified locations use of the term "fitting" in UL Subject 2237 is equivalent to the hazardous (classified) locations use of the terms "plug" or "socket."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Multi-point Interconnection Assembly for Industrial Machinery for Use in Hazardous Locations," "Power Cable Assembly for Industrial Machinery for Use in Hazardous Locations," "Power Cable Plug for Industrial Machinery for Use in Hazardous Locations" or "Power Cable Socket for Industrial Machinery for Use in Hazardous Locations." The words "Hazardous Locations" may be abbreviated "Haz. Loc."

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MUSICAL INSTRUMENTS (PWHZ)

USE

This category covers electrical devices that produce music under the direct control of the player. This category also covers accessories for use with musical instruments, such as rhythm generators, tone cabinets, music tuners, and the like.

RELATED PRODUCTS

Devices that reproduce music from records, magnetic tape or other recording media are covered under Commercial Audio and Radio Equipment, Systems and Accessories (AZIX) and Commercial Phonographs, Tape-playing and Recording Appliances and Accessories (AZQW).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 469, "Musical Instruments and Accessories," UL 6500, "Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use," or ANSI/UL 60065, "Audio, Video, and Similar Electronic Apparatus - Safety Requirements."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Musical Instrument," or other appropriate product name as shown in the individual Listings.

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NEON TRANSFORMERS AND POWER SUPPLIES (PWIK)

NEON TRANSFORMERS AND POWER SUPPLIES (PWIK)

USE

This category covers indoor and outdoor use neon transformers and power supplies intended for use with display signs, outline lighting and luminaires employing gas-filled glass tubing identified as neon or electric discharge tubing.

These transformers and power supplies have been investigated for the secondary-circuit ground-fault protection requirements in ANSI/NFPA 70, "National Electrical Code" (NEC).

This category also covers neon transformer and power-supply accessories intended for use with specific neon transformers and power supplies.

PRODUCT MARKINGS

Transformers and power supplies covered under this category are marked "Indoors," "Outdoors," or "Weatherproof" or "WP." Products marked "Indoors" are only suitable for use indoors, and products marked "Outdoors" are suitable for use indoors or outdoors sheltered from rain, snow and the like by being located within a sign body, enclosure and the like. Products marked "Weatherproof" or "WP" do not need to be additionally sheltered from rain, snow and the like.

Transformers and power supplies covered under this category are marked with a Type number from 2 to 8 in association with the location designation "Indoors," "Outdoors," "Weatherproof" or "WP." These Type numbers identify particular construction features associated with a particular transformer or power supply as identified below:

- **Type 2** - Neon supply with input and output terminals or leads that should be enclosed in accordance with the NEC.
- **Type 3** - Neon supply with input terminals or leads enclosed and intended for connection to a permanent wiring system, and with output terminals or leads that should be enclosed in accordance with the NEC.
- **Type 4** - Neon supply with input and output terminals or leads enclosed and intended for connection to a permanent wiring system.
- **Type 5** - Neon supply with input terminals or leads enclosed and intended for connection to a permanent wiring system and provided with integral receptacles for output connection.
- **Type 6** - Cord-connected neon supply provided with integral receptacles for output connection.
- **Type 7** - Cord-connected neon supply with output terminals or leads that should be enclosed in accordance with the NEC.
- **Type 8** - Cord-connected neon supply with enclosed output terminals or leads.

These Type designations do not relate in any way to general enclosure designations as noted in Electrical Equipment for Use in Ordinary Locations (AALZ).

Transformers and power supplies are also marked with a model designation and may be marked with an optional designation 2161HX, 2161KX, 2161MH or 2161WX. The optional designations provide information on the construction of the transformer and power supply for sign manufacturers and installers to use for ordering and replacement purposes.

Transformers and power supplies marked "For Moving Vehicle Use Only" are intended for use only in moving vehicles and not for use in a freestanding sign, or building-mounted sign or outline lighting product.

Neon transformer and power-supply accessories are marked "For Use With XXX Neon Transformer" or "For Use With XXX Neon Power Supply," where "XXX" indicates the model number, catalog number, part number, or other specific identifier of the neon transformer or neon power supply.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2161, "Neon Transformers and Power Supplies."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Neon Transformer," "Neon Power Supply," "Neon Transformer Accessory" or "Neon Power Supply Accessory."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

NETWORK-POWERED BROADBAND COMMUNICATIONS CABLE (PWIP)

USE

This category covers network-powered broadband communications cable, which is a jacketed single-conductor coaxial cable or a multiple-conductor jacketed cable, consisting of a combination of coaxial members, insulated conductors and/or optic fiber members. The cable is intended for use in low-power and medium-power circuits in accordance with Article 830 of ANSI/NFPA 70, "National Electrical Code" (NEC). All Types, with the exception of Types BLU and BMU, have been investigated for use where exposed to the direct rays of the sun.

PRODUCT MARKINGS

Network-powered broadband communications cable is identified by markings on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

BMU — Indicates medium-power cable intended for outdoor underground use in accordance with Section 830.151(C) of the NEC.

BM — Indicates medium-power cable intended for general use within buildings in accordance with Section 830.151(C) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test described in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," or as an alternative, the damage height of this cable does not exceed 4 ft 11 in. when tested in accordance with the CSA FT4 Vertical-Tray Flame Test also described in UL 1685.

BMR — Indicates medium-power cable intended for use within buildings in vertical shafts in accordance with Section 830.151(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested in accordance with ANSI/UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

BLP — Indicates low-power cable intended for use in ducts or plenums or other spaces used for environmental air in accordance with Section 830.154(B) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame-propagation distance of 5 ft, when tested in accordance with ANSI/NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

BLR — Indicates low-power cable intended for use within buildings in vertical shafts in accordance with Section 830.154(C) of the NEC. The flame propagation height of this cable is less than 12 ft. when tested in accordance with UL 1666.

BL — Indicates low-power cable intended for general use within buildings in accordance with Section 830.154(D) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test described in UL 1685, or as an alternative, the damage height of this cable does not exceed 4 ft. 11 in. when tested in accordance with the CSA FT4 Vertical-Tray Flame Test also described in UL 1685.

BLU — Indicates low-power cable intended for outdoor underground use in accordance with Section 830.154(D)(3) of the NEC.

BLX — Indicates low-power cable intended for limited use within buildings in accordance with Sections 830.154(D)(2), (4) and (5) of the NEC. This cable complies with the VW-1 Flame Test requirements in ANSI/UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

Cable that contains one or more optical-fiber members has the suffix "OF" added to the above.

Cable that complies with the Limited Smoke Requirements specified in UL 1685 is surface marked with the suffix "LS."

Cable marked "-30C," "-40C," "-50C," "-60C" or "-70C" complies with a cold bend test conducted at that temperature.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2261, "Outline of Investigation for Cables for Network-Powered Broadband Communications Systems."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Network-powered Broadband Communications Cable."

The Listing Mark for this category requires the use of a holographic label.

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turer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

NONMETALLIC-SHEATHED CABLE (PWVX)

USE

This category covers Types NM-B and NMC-B nonmetallic-sheathed cable, rated 600 V, intended for use in accordance with Article 334 of ANSI/NFPA 70, "National Electrical Code" (NEC), and certified in copper sizes 14 to 2 AWG inclusive and aluminum or copper-clad aluminum sizes 12 to 2 AWG inclusive.

This cable contains conductors rated 90°C; however, the ampacities of the cable are those of 60°C conductors as specified in Article 334 and Table 310.16 of the NEC.

PRODUCT MARKINGS

Cable with copper-clad aluminum conductors is surface marked "AL (CU-CLAD)" or "Cu-clad Al," and cable with aluminum conductors is surface marked "AL."

Wire and cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

Cable suitable for use in cable trays is appropriately marked. Cable marked for cable tray use may also have a supplementary sunlight resistant marking.

Cable that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surface marked "ST1."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 719, "Nonmetallic-Sheathed Cables."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Nonmetallic-sheathed cable that contains copper or copper-clad aluminum conductors has the product name "Nonmetallic-sheathed Cable"; nonmetallic-sheathed cable that contains aluminum conductors has the product name "Nonmetallic-sheathed Aluminum Cable."

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NONMETALLIC-SHEATHED-CABLE CONNECTORS (PXJV)

GENERAL

This category covers connectors intended for use with nonmetallic-sheathed cable. These connectors are also suitable for use with multiconductor underground feeder and branch-circuit cable where used in dry locations unless otherwise indicated on the carton. These connectors are intended for installation and use in accordance with the following information and the limitations specified in Nonmetallic-sheathed Cable (PWVX).

All male threaded fittings have only been investigated for use with lock-nuts.

Single Cable — If single-conductor Type UF cable is terminated with a fitting not specifically recognized for use with single-conductor cable, special care should be taken to ensure it is properly secured and not subject to change.

The individual certifications may have details about the size and number of the nonmetallic-sheathed cable each connector will secure.

Reusability — Connectors have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction.

Nonmetallic-sheathed-cable Connectors (PXJV)—Continued

MARKINGS

Connectors which are also suitable for use with service-entrance cable, flexible nonmetallic tubing or flexible cord are so indicated on the device or carton.

Except for duplex connectors or when otherwise marked on the carton to indicate connecting of more than one cable or cord, the connectors covered under this category have been investigated for connecting one cable or cord only.

RELATED PRODUCTS

Connectors covered under Armored Cable Connectors (AWSX), Conduit Fittings (DWTT) and Power and Control Tray Cable Connectors (QPOZ) are also suitable for use with nonmetallic-sheathed cable when specifically indicated on the device or carton.

Connectors suitable for flexible cord only are covered under Outlet Bushings and Fittings (QCRV).

ADDITIONAL INFORMATION

For additional information, see Nonmetallic-sheathed Cable (PWVX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonmetallic Sheathed Cable Connector" (or "N.M. Cable Connector"), or other appropriate product name as shown in the individual Listings.

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NONMETALLIC EXTENSIONS (PXXT)

NONMETALLIC-EXTENSION FITTINGS (PYYZ)

USE

This category covers attachment-plug caps, receptacles for attachment plugs, and end caps for nonmetallic surface extensions, and wiring compartments, entrance bushings, bonding connectors, hangers, terminal fittings, support fittings, receptacles and lampholders for aerial cable.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 5A, "Nonmetallic Surface Raceways and Fittings," ANSI/UL 183, "Manufactured Wiring Systems," and ANSI/UL 498, "Attachment Plugs and Receptacles."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonmetallic Extension Fitting" (or "NM Extension Ftg.") or "End Cap," or other appropriate product name as shown in the individual Listings.

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NONMETALLIC SURFACE EXTENSIONS (PZMX)

USE AND INSTALLATION

This category covers assemblies of two insulated circuit conductors with or without a grounding conductor within a nonmetallic jacket or extruded thermoplastic covering, intended for installation in accordance with Article

Nonmetallic Surface Extensions (PZMX)—Continued

382 of ANSI/NFPA 70, "National Electrical Code." Assemblies without a grounding conductor are marked "Intended for replacement use only."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 5A, "Nonmetallic Surface Raceways and Fittings," ANSI/UL 183, "Manufactured Wiring Systems," and ANSI/UL 498, "Attachment Plugs and Receptacles."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonmetallic Surface Extension."

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NONMETALLIC-SHEATHED CABLE INTERCONNECTORS (QAAV)

GENERAL

This category covers self-contained interconnectors employing pressure cable connectors, insulation displacement or insulation piercing connectors for splicing or tapping nonmetallic (NM) sheathed cable. These interconnectors are intended for use in exposed or concealed locations in accordance with the following Articles of ANSI/NFPA 70, "National Electrical Code":

Article 545, *Manufactured Buildings*

Article 550, *Mobile Homes, Manufactured Homes, and Mobile Home Parks*

Article 551, *Recreational Vehicles and Recreational Vehicle Parks*

Article 334, *Nonmetallic-Sheathed Cable: Types NM, NMC, and NMS* (for tap devices)

These devices have been investigated for equivalency to Type NM cable in insulation and temperature rise, and for capability to withstand fault currents, vibration and mechanical shock that may occur during transport of the units in which they are used.

PRODUCT MARKINGS

The devices are marked with the Lister's name or identification, the catalog number or equivalent, and complete electrical ratings.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2256, "Outline of Investigation for Nonmetallic Sheathed Cable Interconnects."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonmetallic Sheathed Cable Interconnector" (or "N.M. Cable Interconnector"), or other appropriate product name as shown in the individual Listings.

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COMMERCIAL SEATING SYSTEMS (QAHU)

GENERAL

This category covers single- or multiple-seating systems that may be provided with an integral table and contain electrical accessories, such as an electrical distribution system, and may also be provided with channels for routing communication wiring. The seating is intended to be permanently mounted to the building structure.

COMMERCIAL SEATING SYSTEMS (QAHU)

This category covers only the electrical hazards associated with the product.

RELATED PRODUCTS

Electrical accessories designed for field installation, such as receptacles, electrical distribution systems, power distribution elements, etc., are covered under Office Furnishings (QAWZ) and are marked to identify the specific seating system with which they have been investigated for use.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1286, "Office Furnishings."

Where indicated in the individual certifications, commercial seating systems have also been investigated in accordance with one or more of the following standards:

1. State of California Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation, Technical Bulletin 117, "The Test Procedure and Apparatus for Testing the Flame Retardance of Resilient Filling Materials Used in Upholstered Furniture" (2000)
2. For flammability in accordance with State of California Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation, Technical Bulletin 133, "The Flammability Test Procedure for Seating Furniture for Use in Public Occupancies" (1991)
3. For strength and durability in accordance with ANSI/BIFMA No. X5.4, "The Standard for Office Furnishing Lounge Seating" (1997)

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**POWERED SEATING SYSTEM*
FOR ELECTRICAL HAZARD ONLY**

Control No.

* or other appropriate product name as shown in the individual Classifications

Where indicated in the individual Classifications, the Classification Mark will also include one or more of the following statements:

**ALSO CLASSIFIED IN ACCORDANCE WITH
THE STATE OF CALIFORNIA DEPARTMENT OF CONSUMER AFFAIRS
BUREAU OF HOME FURNISHINGS AND THERMAL INSULATION
TECHNICAL BULLETIN 117 (2000)
and/or**

**ALSO CLASSIFIED IN ACCORDANCE WITH
THE STATE OF CALIFORNIA DEPARTMENT OF CONSUMER AFFAIRS
BUREAU OF HOME FURNISHINGS AND THERMAL INSULATION
TECHNICAL BULLETIN 133 (1991)
and/or**

**ALSO CLASSIFIED IN ACCORDANCE WITH
THE STANDARD FOR OFFICE FURNITURE LOUNGE SEATING
ANSI/BIFMA No. X5.4-1997**

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**OFFICE APPLIANCES AND
BUSINESS EQUIPMENT FOR USE IN
HAZARDOUS LOCATIONS (QAVS)**

GENERAL

This category covers equipment and appliances normally used in business establishments classified as hazardous locations. The equipment and appliances may be electromechanical and/or electronic.

Intrinsically safe equipment is so marked on the product.

To maintain the intrinsically safe features of battery-operated appliances, only batteries of the type and size indicated on the product should be used.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

OFFICE APPLIANCES AND BUSINESS EQUIPMENT FOR USE IN
HAZARDOUS LOCATIONS (QAVS)

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Office Appliance for Use in Hazardous Locations" or "Business Equipment for Use in Hazardous Locations."

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OFFICE FURNISHINGS (QAWZ)

USE AND INSTALLATION

This category covers office furnishings that consist of panels, study carrels, work stations and pedestal-style systems that may be mechanically interconnected to form an office furnishing system to be installed in accordance with Article 605 of ANSI/NFPA 70, "National Electrical Code" (NEC). They may be provided with an electrical distribution system, including switches and receptacles. They may contain channels for routing communication cable within the system components separate from power-circuit raceways. The systems may include filing cabinets, desks, work surfaces, shelves, storage units, etc., that have a particular electrical or mechanical function unique to an office furnishing system.

Products specifically designed and arranged for field installation in office furnishings such as lighting units, clocks, work surfaces, shelves, etc., are covered as accessories under Office Furnishing Accessories Certified for Use with Specified Equipment (QAXE) and are marked to identify the specific office furnishing with which they have been investigated.

The surface-burning characteristics of building materials employed in these assemblies is judged to be no greater than that of ordinary lumber used in on-site construction. Finished surfaces are of materials having a flame-spread rating of 200 or less and 450 smoke index or less unless otherwise marked.

Office furnishing electrical systems may be suitable for connection to optional standby power systems in accordance with the NEC.

Office furnishing electrical systems are available in single-phase and three-phase wiring systems and may provide multi-circuit branch circuits to an office furnishing. Some office furnishings are connected to more than one source of supply, such as an uninterruptible power supply, in addition to the building service-entrance power.

When the office furnishing electrical system is supplied with hospital-grade receptacles, the office furnishing electrical system is not suitable for use in general patient care areas or critical patient care areas. The electrical system has not been investigated for use where Article 517 of the NEC requires hospital-grade components and redundant grounding systems.

REBUILT PRODUCTS

This category also covers office furnishings and office furnishing accessories that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt office furnishings and office furnishing accessories are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt office furnishings and office furnishing accessories are subject to the same requirements as new office furnishings and office furnishing accessories.

INSTRUCTIONS AND PRODUCT MARKINGS

Finished surfaces have a flame-spread rating of 200 or less. When a smoke-developed rating exceeds 450, the system is marked "Smoke Developed Index Over 450."

Office furnishings are marked with one of the following type designations:

Type I — A system that includes all parts and contains pre-wired modular raceways and accessories necessitating only quick-connect type of electrical interconnections. A Type I system may be shipped with the accessories installed in the panel, or, where not factory installed, the accessory is intended for field installation and marked for use in the system. Means for permanent wiring connections to the branch-circuit supply are provided.

Type II — A system that provides raceways and devices for routing and termination of wiring. All wiring is installed in the field.

Type III — A system that is not intended to be wired and has no provision for routing and termination of wiring.

Each office furnishing accessory (work surface, cabinet or electrical system) that is shipped separately from the major office furnishing unit to which it is to be connected is marked "For Use with Office Furnishing System Series _____," in which the appropriate series or catalog number is designated. When separable components are factory assembled and shipped together, only the complete assembly and not the component is marked.

Each top- and base-feed wiring assembly is marked with a diagram or the equivalent, indicating the methods of connection to the branch circuit and the electrical rating.

Each top- and base-feed wiring assembly is marked with "WARNING" and the following or equivalent statement: "Risk of Fire or Electric Shock. It is possible for this office furnishing system to be connected to more than one source of supply. Disconnect all sources prior to any servicing."

Each convenience receptacle is marked by a letter, number, color, or similar designation to indicate the circuit in the system to which the receptacle is connected. The identification is consistent throughout any one office furnishing electrical system and with any markings on the diagram for the branch-circuit connections.

A wiring-system jumper (manufactured wiring system to office furnishing wiring system) is marked to identify the manufactured wiring system with which the jumper is intended to be used.

RELATED PRODUCTS

Partitions that extend to the ceiling or used to support the building structure are covered under Sections and Units (QQXX).

Composite panels certified with respect to the NEC and/or one or more model building codes, plumbing codes, state building codes or local building codes are covered under Composite Panels (QRSY).

Lighting units intended for use with office furnishings are covered under Office Furnishing Lights (QAXB).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1286, "Office Furnishings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Office Furnishing" or "Office Furnishing Accessory."

For rebuilt products, the word "Rebuilt" precedes the product name.

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OFFICE FURNISHING LIGHTS (QAXB)

GENERAL

This category covers lights intended for use with office furnishings when installed in accordance with Articles 410 and 605 of ANSI/NFPA 70, "National Electrical Code." This category covers both freestanding and mounted lights that may be electrically or mechanically connected to an office furnishing. Products specifically designed and arranged for use with an individual design of office furnishing are marked to identify the specific office furnishing with which they have been investigated.

Products that require electrical assembly in the field are covered as kits or light accessories under the individual certifications. Kits and light accessories are completely wired to the extent permitted by the intended field installation, with all splices and connections completed and with all electrical components mounted.

A kit forms a complete office furnishing light when assembled in accordance with the instructions provided.

A light accessory and the required office furnishing or a combination of light accessories form a complete office furnishing light when assembled in accordance with the instructions provided.

The individual certifications may include one or more Roman numerals (from II through XIV) that had previously been used to identify certain types of portable luminaires covered under that certification. This identification system is no longer in use, and these Roman numerals can be disregarded.

REBUILT PRODUCTS

This category also covers office furnishing lights that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt office furnishing lights are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt office furnishing lights are subject to the same requirements as new office furnishing lights.

RELATED PRODUCTS

Office furnishing lights investigated to ANSI/UL 153, "Portable Electric Luminaires," may also be covered under Luminaires, Portable (QOWZ).

Office furnishing light accessories investigated to ANSI/UL 153 may also be covered under Portable Luminaire Kits and Subassemblies (QPAU).

Office furnishing light accessories investigated to ANSI/UL 1598, "Luminaires," may also be covered under Luminaire Fittings (IFFX).

Office Furnishing Lights (QAXB)—Continued

ADDITIONAL INFORMATION

For additional information, see Office Furnishings (QAWZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 153, "Portable Electric Luminaires," ANSI/UL 1598, "Luminaires," and ANSI/UL 1286, "Office Furnishings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Office Furnishing Light," "Office Furnishing Light Kit," "Office Furnishing Light Accessory" or "Rebuilt Office Furnishing Light."

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OFFICE FURNISHING ACCESSORIES CLASSIFIED FOR USE WITH SPECIFIED EQUIPMENT (QAXE)

USE AND INSTALLATION

This category covers office furnishing accessories, such as work surfaces and shelves, intended for field installation in specific combinations that have been investigated for use with the specific office furnishing systems.

These accessories have been investigated for use with other manufacturers' Listed office furnishings, as indicated in the Classification Mark or the referenced compatibility list.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1286, "Office Furnishings."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**FOR USE WITH SPECIFIED EQUIPMENT
FOR USE WITH UL LISTED * OFFICE FURNISHING PANEL SYSTEM
Control No.**

* Manufacturer's name and model no(s).

or

**FOR USE WITH SPECIFIED EQUIPMENT
FOR CATALOG NUMBERS OF COMPATIBLE EQUIPMENT,
REFER TO PUBLICATION NO. ___ PROVIDED WITH THIS PRODUCT.
IF ADDITIONAL INFORMATION IS NECESSARY, CONTACT THE
FACTORY.
Control No.**

The referenced publication is a compatibility list that tabulates the company names, catalog numbers and electrical ratings of the Classified accessories, and the company name(s) and catalog number(s) of the applicable UL Listed products with which the accessories have been investigated. One copy of the compatibility list and the installation instructions are provided with each accessory.

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OPTICAL FIBER CABLE (QAYK)

USE AND INSTALLATION

This category covers optical fiber cable which is a jacketed cable for use within buildings in accordance with Article 770 of ANSI/NFPA 70, "National Electrical Code" (NEC). Where optical fiber is installed in a laser system, the system shall comply with the ANSI Z136 laser system safety standards.

PRODUCT MARKINGS

Optical fiber cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

OFC — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in accordance with Section 770.154(C) of the NEC. This cable does not spread fire to the top of the tray when tested as described under UL Flame Exposure (smoke measurements are not applicable) in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

OFN — This cable is the same as Type OFC except it contains no metallic members and no other electrical conductive materials.

OFCG — Indicates cable containing noncurrent-carrying conductive members, such as metallic strength members and metallic vapor barriers, for use in accordance with Section 770.154(C) of the NEC. The damage height of this cable does not exceed 4 ft 11 in. when tested as described under FT4/IEEE 1202, "Type of Flame Exposure" (smoke measurements are not applicable) in UL 1685.

OFNG — This cable is the same as Type OFCG except it contains no metallic members and no other electrically conductive materials.

OFNR — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in vertical runs in a shaft in accordance with Section 770.154(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per ANSI/UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

OFNCR — This cable is the same as Type OFNR except it contains no metallic members and no other electrically conductive materials.

OFNCP — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in ducts or plenums or other spaces used for environmental air in accordance with Section 770.154(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested per ANSI/NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

OFNFP — This cable is the same as Type OFNCP except it contains no metallic members and no other electrically conductive materials.

Cable that complies with the requirements for "Limited Combustible" specified in ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Cable that complies with the Limited Smoke Requirements specified in UL 1685 is surface marked with the suffix "LS."

Cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1651, "Optical Fiber Cable."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Optical Fiber Cable."

The Listing Mark for this category requires the use of a holographic label.

Cable also Verified to a performance specification under Optical Fiber Cable Verified in Accordance with National or International Specifications (QAZI) has the marking "Also Verified [Specification name and/or number]" together with the Listing Mark information on the tag, reel or smallest unit container.

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OPTICAL FIBER CABLE, FIELD ASSEMBLED (QAZD)

USE AND INSTALLATION

This category covers field-assembled optical fiber cable, which is an on-site assembly of one or more optical fiber units and an optical fiber jacket. Field-assembled optical fiber cable is intended for installation in buildings in accordance with Article 770 of ANSI/NFPA 70, "National Electrical Code" (NEC). The optical fiber jacket is installed in a manner

Optical Fiber Cable, Field Assembled (QAZD)—Continued

similar to conduit or raceway. Once the jacket is installed, the optical fiber units are inserted into the jacket, completing the assembly.

Laser systems in which optical fiber is installed comply with the following Laser Institute of America safety standards:

ANSI/LIA Z136.1, "Safe Use of Lasers"

ANSI/LIA Z136.2, "Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode and LED Sources"

ANSI/LIA Z136.3, "Safe Use of Lasers in Health Care Facilities"

ANSI/LIA Z136.4, "Recommended Practice for Laser Safety Measurements for Hazard Evaluation"

ANSI/LIA Z136.5, "Safe Use of Lasers in Educational Institutions"

ANSI/LIA Z136.6, "Safe Use of Lasers Outdoors"

PRODUCT MARKINGS

Optical fiber cable is identified by a marking on the surface of the jacket. This marking includes the Listee's name and catalog designation and one of the following Type designations:

OFC — Indicates cable containing noncurrent-carrying conductive members, such as metallic strength members and metallic vapor barriers, for use in accordance with Section 770.154(C) of the NEC. This cable does not spread fire to the top of the tray when tested as described under UL Flame Exposure (smoke measurements are not applicable) in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

OFN — This cable is the same as Type OFC except it contains no metallic members and no other electrical conductive materials.

OFCG — Indicates cable containing noncurrent-carrying conductive members, such as metallic strength members and metallic vapor barriers, for use in accordance with Section 770.154(C) of the NEC. The damage height of this cable does not exceed 4 ft 11 in. when tested as described under FT4/IEEE 1202, "Type of Flame Exposure" (smoke measurements are not applicable) in UL 1685.

OFNG — This cable is the same as Type OFCG except it contains no metallic members and no other electrically conductive materials.

OFNR — Indicates cable containing noncurrent-carrying conductive members, such as metallic strength members and metallic vapor barriers, for use in vertical runs in a shaft in accordance with Section 770.154(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per ANSI/UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

OFNCR — This cable is the same as Type OFNR except it contains no metallic members and no other electrically conductive materials.

OFNCP — Indicates cable containing noncurrent-carrying conductive members, such as metallic strength members and metallic vapor barriers, for use in ducts or plenums or other spaces used for environmental air in accordance with Section 770.154(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested per ANSI/NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

OFNFP — This cable is the same as Type OFNCP except it contains no metallic members and no other electrically conductive materials.

Cable marked "Sunlight Resistant" (or "Sun Res") may be exposed to the direct rays of the sun.

The marking on the attached tag, coil, reel or smallest unit container in which the optical fiber jacket is packaged includes the following: "For Use Only with Optical Fiber Units, Cat. No.____, manufactured by [company name]."

The marking on the attached tag, coil, reel or smallest unit container in which the optical fiber units are packaged includes the following: "[Company name] Optical Fiber Unit, For Use Only With Optical Fiber Jacket Cat. No. ____, manufactured by [company name]."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1651, "Optical Fiber Cable."

UL MARK

The UL symbol on the optical fiber jacket and the Listing Mark of UL on the attached tag, coil, reel or smallest unit container in which the optical fiber jacket is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Field Assembled Optical Fiber Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Optical Fiber Cable, Field Assembled (QAZD)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

OPTICAL FIBER CABLE VERIFIED IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (QAZI)

GENERAL

This category covers data transmission optical fiber cable whose signal transmission, environmental and/or mechanical performance characteristics have been investigated in accordance with one or more of the applicable U.S. national standards, published international standards, regional standards, miscellaneous standards, or regulations of other organizations, as indicated in the individual Verifications. This cable is not necessarily investigated for use in accordance with ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The performance specifications used to investigate products in this category are contained in Telcordia GR-20-CORE, "Generic Requirements for Optical Fiber and Optical Fiber Cable" (Issue 2 July 1998). Other performance specifications, applicable to optical fiber cable, may also be used by UL in Verification investigations.

UL MARK

The UL symbol with the word "VERIFIED" on the product and the Verification Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "VERIFIED," a control number, the product name "Optical Fiber Cable," the Specification name(s) and/or number(s), and the date(s) of the Specification(s).

For optical fiber cable which is also Listed under Optical Fiber Cable (QAYK), the marking includes the appropriate Listing Mark and the text "Also Verified [Specification name(s) and/or number(s), date(s) of Specification(s)]."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

OPTICAL FIBER/COMMUNICATIONS/SIGNALING/COAXIAL CABLE RACEWAY (QAZM)

USE AND INSTALLATION

This category covers raceway and fittings for installation of conductive and nonconductive optical fiber cable, communications cable, power-limited fire-alarm cable, signaling cable and coaxial cable in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). This raceway is intended for installation and use in accordance with the following information. The raceway is only suitable for the installation of the optical fiber, communications cable, signaling cable and coaxial cable noted in the following information. Individual raceway systems differ in their construction and, therefore, their components are not interchangeable with other raceway or fittings of other systems. This category includes pliable lengths, rigid straight sections, elbows, bends and fittings such as expansion joints, female and male adapters, and couplings.

A raceway marked "Plenum" is suitable for use in ducts, plenums or other spaces used for environmental air in accordance with the NEC when used to enclose optical fiber cable marked "OFNP" or "OFCP," communications cable marked "CMP" or "CMP-OF," power-limited fire-alarm cable marked "FPLP," signaling cable marked "CL2P" or "CL3P," and coaxial cable marked "CATVP." This raceway exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame-spread distance of 5 ft when tested in accordance with the Test for Flame Propagation and Smoke-Density Values (Plenum) in ANSI/UL 2024.

"Signaling, Optical Fiber and Communications Raceways and Cable Routing Assemblies." This raceway is identified by a marking on the surface of the raceway or on a marker tape indicating "Plenum." A raceway marked "Plenum" is also suitable for installation in risers when used to enclose optical fiber cable marked "OFNP" or "OFNR," communications cable marked "CMP," "CMP-OF," "CMR" or "CMR-OF," power-limited fire-alarm cable marked "FPLP" or "FPLR," signaling cable marked "CL2P," "CL3P," "CL2R" or "CL3R," and coaxial cable marked "CATVP" or "CATVR," and general-purpose use when used to enclose optical fiber cable marked "OFNP," "OFCP," "OFNR," "OFNR," "OFNR," "OFNG" or "OFN," communications cable marked "CMP," "CMP-OF," "CMR," "CMR-OF," "CMG," "CMG-OF," "CM" or "CM-OF," power-limited fire-alarm cable marked "FPLP," "FPLR" or "FPL," signaling cable marked "CL2P," "CL3P," "CL2R," "CL3R," "CL2," "CL3," "CL2X" or "CL3X," and coaxial cable marked "CATVP," "CATVR," "CATV" or "CATVX."

A raceway marked "Riser" is suitable for installation in risers in accordance with the NEC when used to enclose optical fiber cable marked "OFNP," "OFCP," "OFNR" or "OFNR," communications cable marked "CMP," "CMP-OF," "CMR" or "CMR-OF," power-limited fire-alarm cable marked "FPLP" or "FPLR," signaling cable marked "CL2P," "CL3P," "CL2R" or "CL3R," and coaxial cable marked "CATVP" or "CATVR." This raceway has fire-resistant characteristics capable of preventing the carrying of fire from floor to floor. This raceway meets the test requirements of the Test for Flame Propagation (Riser) in ANSI/UL 2024. This raceway is identified by a marking on the surface of the raceway or on a marker tape indicating "Riser." A raceway marked "Riser" is also suitable for general-purpose use when used to enclose optical fiber cable marked "OFNP," "OFNR," "OFCP," "OFNR" or "OFN," communications cable marked "CMP," "CMP-OF," "CMR," "CMR-OF," "CMG," "CMG-OF," "CM" or "CM-OF," power-limited fire-alarm cable marked "FPLP," "FPLR" or "FPL," signaling cable marked "CL2P," "CL3P," "CL2R," "CL3R," "CL2," "CL3," "CL2X" or "CL3X," and coaxial cable marked "CATVP," "CATVR," "CATV" or "CATVX."

A raceway with neither the marking "Plenum" nor "Riser" is suitable for general-purpose use, with the exception of risers, plenums, and other spaces used for environmental air when used to enclose optical fiber cable marked "OFNP," "OFCP," "OFNR," "OFNR," "OFNR," "OFNG," "OFCG," "OFC" or "OFN," communications cable marked "CMG," "CMG-OF," "CM," "CM-OF," "CMR," "CMR-OF," "CMP" or "CMP-OF," power-limited fire-alarm cable marked "FPLP," "FPLR" or "FPL," signaling cable marked "CL2P," "CL3P," "CL2R," "CL3R," "CL2," "CL3," "CL2X" or "CL3X," and coaxial cable marked "CATVP," "CATVR," "CATV" or "CATVX." This raceway is resistant to the spread of fire when tested in accordance with the Vertical-Tray Flame Test (General Use) in ANSI/UL 2024.

Pliable raceway is a raceway that can be bent by hand without the use of tools. The smallest radius of the curve of the inner edge of any bend to which the raceway may be bent without cracking either on the outer surface or internally is not less than 2-1/2 times the outside diameter of the raceway.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2024, "Signaling, Optical Fiber and Communications Raceways and Cable Routing Assemblies."

UL MARK

The UL symbol and the product name "Optical Fiber Raceway," "Communications Cable Raceway," "Signaling Cable Raceway," "Coaxial Cable Raceway" or "Optical Fiber/Communications/Signaling/Coaxial Cable Raceway" on the raceway, and the Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the appropriate product names as indicated above.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

OPTICAL FIBER RACEWAY ASSEMBLIES (QAZQ)

GENERAL

This category covers raceway assemblies intended for the installation of conductive and nonconductive optical fiber cable in accordance with ANSI/NFPA 70, "National Electrical Code." These raceway assemblies are intended for installation and use in accordance with the following information. The raceway may be provided with multiple inner ducts that are

Optical Fiber Raceway Assemblies (QAZQ)—Continued

assembled before shipment. Raceway systems differ in their inside and outside diameters and, therefore, are not interchangeable with other conduit or raceway systems. This category includes straight sections, elbows, bends, and fittings intended to be secured together by cement.

The raceway assemblies are designed for use under the following conditions, as indicated in the Certification Mark: (1) direct burial with or without being encased in concrete, (2) aboveground, or both (1) and (2).

The transition from an optical fiber raceway system to another conduit or raceway system has not been investigated.

The raceway system components have not been investigated for their ability to withstand exposure to reagents, unless specifically marked.

Aboveground raceway assemblies are suitable for exposed work where not subjected to physical damage and where expansion fittings are not necessary.

ADDITIONAL INFORMATION

For additional information, see Optical Fiber/Communications Cable Raceway (QAZM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 2024, "Signaling, Optical Fiber and Communications Raceways and Cable Routing Assemblies," and ANSI/UL 651, "Schedule 40 and 80 Rigid PVC Conduit and Fittings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Optical Fiber Raceway Assemblies, Underground," "Optical Fiber Raceway Assemblies, Underground for Concrete Encasement Only," "Optical Fiber Raceway Assemblies, Underground Direct Burial and Concrete Encasement" or "Optical Fiber Raceway Assemblies, Aboveground, Underground Direct Burial and Concrete Encasement."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**OPTICAL FIBER/COMMUNICATIONS/
SIGNALING/COAXIAL CABLE
OUTLET BOXES (QAZR)**

USE AND INSTALLATION

This category covers outlet boxes and other device-mounting products intended to support outlets for use with or without raceways and fittings that contain nonconductive optical fiber cable, communications cable, signaling cable, and coaxial cable. These products are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code." The products and raceways are only suitable for the installation of the optical fiber, communications cable, signaling cable, and coaxial cable. Individual raceway systems differ in their construction and, therefore, their components are not interchangeable with other raceways or fittings of other systems.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2269, "Outline of Investigation for Optical Fiber/Communications/Signaling/Coaxial Cable Outlet Boxes."

UL MARK

The Listing Mark on the product, or the UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Optical Fiber Outlet Box," "Communications Cable Outlet Box" or "Optical Fiber/Communications/Signaling/Coaxial Cable Outlet Box," or other appropriate product name as shown in the individual Listings.

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any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**OUTLET BOX ACCESSORIES FOR
USE IN HAZARDOUS LOCATIONS
(QAZV)**

GENERAL

This category covers conduit box bodies, flat and domed covers, fixture hanger covers, threaded extensions, sealing hub covers, and similar sub-assemblies of outlet boxes, fixture fittings and conduit fittings. They are intended to be assembled at the factory or in the field by the user to form a complete explosion-proof or dust-ignition-proof enclosure. Information on restrictions in the use and assembly of these devices is marked on each part.

RELATED PRODUCTS

See Outlet Boxes for Use in Hazardous Locations (QBCR), Conduit Fittings for Use in Hazardous Locations (EBNV) and Luminaire Fittings for Use in Hazardous Locations (IGIV).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Outlet Box Accessory for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**CABLE ROUTING ASSEMBLIES
(QBAA)**

USE AND INSTALLATION

This category covers routing assemblies for installation of conductive and nonconductive optical fiber cable, communications cable/wire, power-limited fire-alarm cable, community antenna television cable and low-power network-powered broadband communications cable. Cable-routing assemblies are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). Cable-routing assemblies are only suitable for the installation of cable/wire noted in the following information. Individual routing assembly systems differ in their construction and, therefore, their components are not interchangeable with other routing assemblies or fittings of other systems. This category includes pliable lengths, rigid straight sections, elbows, bends, and fittings such as expansion joints, female and male adapters, and couplings.

These products may or may not incorporate end fixtures or covers.

Cable/Wire Type

Routing Assembly Marking/Use	Optical Fiber	Communications	Power-limited Fire Alarm	Community Antenna Television	Low-power Network-powered Broadband Communications
Plenum Riser	OFNP	CMP	FPLP	CATVP	BLP
	OFNR	CMR	FPLR	CATVR	BLR
	OFCP				
	OFNR				
None (general use)	OFNP	CMP	FPLP	CATVP	BLP
	OFNR	CMR	FPLR	CATVR	BLR
	OFN	CM, CMG	FPL	CATV	BL
	OFNG				
	OFCP	connect			
	OFNR	wire			

A routing assembly marked "Plenum" is suitable for use in fabricated ducts or other spaces used for environmental air (plenum) where used to support cable as identified in the table above. This "plenum" routing assembly exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft where tested in accordance with ANSI/UL 2024, "Signaling, Optical Fiber and Communications Raceways and Cable Routing Assemblies." A routing assembly marked "Plenum" is also suitable for installation in risers where used to support cable identified for riser use in the table above. A routing assembly marked "Plenum" is also suitable for general use where used to support any of the cable identified for general use in the table above.

A routing assembly marked "Riser" is suitable for installation in riser installations where used to support cable as identified in the table above. This "riser" routing assembly has fire-resistant characteristics capable of preventing the spread of fire from floor to floor. This "riser" routing assembly meets the test requirements of ANSI/UL 2024. A routing assembly marked "Riser" is also suitable for general use where used to support any of the cable identified for general use in the table above.

A routing assembly with neither the marking "Plenum" nor "Riser" is suitable for general use to support cable as identified in the table above. This "general use" routing assembly is resistant to the spread of fire where tested in accordance with the Vertical-Tray Flame Test (General Use) in ANSI/UL 2024.

RELATED PRODUCTS

Optical fiber and communications cable raceway intended to be installed in accordance with Sections 770.154(A) and 800.154(A) of the NEC is covered under Optical Fiber/Communications/Signaling/Coaxial Cable Raceway (QAZM).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2024, "Signaling, Optical Fiber and Communications Raceways and Cable Routing Assemblies."

UL MARK

The UL symbol on the product and the complete Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "General-use Cable Routing Assembly," "Riser Cable Routing Assembly," "Plenum Cable Routing Assembly," "Optical Fiber Routing Assembly," "Communications Cable Routing Assembly" or "Optical Fiber/Communications Cable Routing Assembly."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

OUTLET BOXES FOR USE IN HAZARDOUS LOCATIONS (QBCR)

GENERAL

This category covers conduit boxes for use in threaded rigid conduit or steel intermediate metal conduit wire raceways. They provide for splicing of

conductors, but conductors should not be sealed in conduit boxes. The boxes are marked to indicate when accessories such as unions and sealing fittings are furnished with the box.

Boxes marked "rain tight" have been subjected to tests designed to simulate exposure to beating rain to determine that such exposure will not result in entrance of water.

Cast-aluminum alloy outlet boxes are not considered acceptable for installation in concrete or cinder fill unless protected with asphalt base paint or the equivalent.

RELATED PRODUCTS

See Conduit Fittings for Use in Hazardous Locations (EBNV).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product, or the Listing Mark on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Outlet Box for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

OPTICAL FIBER BRANCHING DEVICES (QBEA)

GENERAL

This category covers optical fiber branching devices intended for residential and/or commercial applications as part of an optical fiber wiring system.

Optical fiber branching devices include optical flexible circuits, fan-out devices, wavelength division multiplexers (WDM and DWDM) and other similar passive devices.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 746C, "Polymeric Materials - Use in Electrical Equipment Evaluations."

Branching devices employing optical fiber connectors have additionally been investigated to TIA-455-6-B, "FOTP-6 - Cable Retention Test Procedure for Fiber Optic Cable Interconnecting Devices."

UL MARK

The Listing Mark of UL on the product, on the attached tag, or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Optical Fiber Branching Device."

For optical fiber branching devices which are also Verified to a performance specification under Optical Fiber Branching Devices Verified in Accordance with National or International Specifications (QBEN), the marking includes the appropriate Listing Mark and either the text "Also Verified [Specification name and/or number]" or the UL Verification Mark along with [Specification name and/or number].

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

OPTICAL FIBER BRANCHING DEVICES VERIFIED IN
ACCORDANCE WITH NATIONAL OR INTERNATIONAL
SPECIFICATIONS (QBEN)

**OPTICAL FIBER BRANCHING
DEVICES VERIFIED IN
ACCORDANCE WITH NATIONAL OR
INTERNATIONAL SPECIFICATIONS
(QBEN)**

GENERAL

This category covers optical fiber branching devices whose signal transmission, environmental and/or mechanical performance characteristics have been investigated in accordance with one or more of the applicable U.S. national standards, published international standards, regional standards, miscellaneous standards, or regulations of other organizations, as indicated in the individual Verifications.

Optical fiber branching devices include optical flexible circuits, fan-out devices, wavelength division multiplexers (WDM and DWDM) and other similar passive devices. These devices are intended for residential and/or commercial applications as part of an optical fiber wiring system.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The performance specifications used to investigate products in this category are contained in Telcordia GR-2866-CORE (Issue 1 June 1995), "Generic Requirements for Optical Fiber Ribbon Fanouts." Other performance specifications applicable to optical fiber cable assemblies and connector products may also be used by UL in Verification investigations.

UL MARK

The Verification Mark of UL on the product or on the attached tag or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "VERIFIED," a control number, the product name "Optical Fiber Branching Device," the Specification name(s) and/or number(s), and the date of the Specification(s).

For optical fiber branching devices which are also Listed under Optical Fiber Branching Devices (QBFA), the marking includes the appropriate Listing Mark and either the text "Also Verified [Specification name(s) and/or number(s)]," or the UL Verification Mark together with the Specification name(s) and/or number(s) and the date of the Specification(s).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**OPTICAL FIBER CABLE
ASSEMBLIES AND CONNECTORS
(QBFA)**

GENERAL

This category covers factory-assembled optical fiber cable assemblies and factory/field-installed connector products intended for residential and/or commercial applications as part of an optical fiber wiring system.

Optical fiber cable assemblies consist of optical fiber cable and optical fiber cable connectors. When constructed with a certified cable identified by a marking on the surface of the jacket as a type permitted in Article 770 of ANSI/NFPA 70, "National Electrical Code" (NEC), optical fiber cable assemblies may be installed in accordance with that Article.

These assemblies have not been investigated for use in environmental air spaces in accordance with Sections 300.22(B) and (C) of the NEC unless specifically marked for the application.

Optical fiber cable connectors are intended for factory assembly or for field assembly by trained service personnel.

RELATED PRODUCTS

Optical fiber cable (without connectors) for use within buildings in accordance with Article 770 of the NEC is covered under Optical Fiber Cable (QAYK).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate optical fiber connectors is ANSI/UL 746C, "Polymeric Materials - Use in Electrical Equipment Evaluations."

OPTICAL FIBER CABLE ASSEMBLIES AND CONNECTORS
(QBFA)

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PRODUCT CATEGORIES BY CATEGORY CODE

The basic standards used to investigate optical fiber cable assemblies are ANSI/UL 1651, "Optical Fiber Cable" (where certified cable is employed) or ANSI/UL 2556, "Wire and Cable Test Methods" (for noncertified cable VW-1 rating) and, for connectors, ANSI/UL 746C and TIA-455-6-B, "FOTP-6 - Cable Retention Test Procedure for Fiber Optic Cable Interconnecting Devices."

Cable assemblies marked suitable for use in air-handling spaces are additionally investigated to UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces," if nonmetallic materials weighing more than 30 grams are used.

UL MARK

The Listing Mark of UL on the product or on the attached tag or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Optical Fiber Cable Assembly" or "Optical Fiber Connector."

For optical fiber cable assemblies and optical fiber connectors which are also Verified to a performance specification under Optical Fiber Cable Assemblies and Connectors Verified in Accordance with National or International Specifications (QBFA), the marking includes the appropriate Listing Mark and either the text "Also Verified [Specification name and/or number]," or the UL Verification Mark together with the Specification name and/or number.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**OPTICAL FIBER CABLE
ASSEMBLIES AND CONNECTORS
VERIFIED IN ACCORDANCE WITH
NATIONAL OR INTERNATIONAL
SPECIFICATIONS (QBFA)**

GENERAL

This category covers optical fiber cable assemblies and connector products whose signal transmission, environmental and/or mechanical performance characteristics have been investigated in accordance with one or more of the applicable U.S. national standards, published international standards, regional standards, miscellaneous standards, or regulations of other organizations, as indicated in the individual Verifications.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The performance specifications used to investigate products in this category are contained in Telcordia GR-326-CORE (Issue 3 September 1999), "Generic Requirements for Singlemode Optical Connectors and Jumper Assemblies." Other performance specifications, applicable to optical fiber cable assemblies and connector products, may also be used by UL in Verification investigations.

UL MARK

The Verification Mark of UL on the product or on the attached tag or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "VERIFIED," a control number, the product name "Optical Cable Assembly" or "Optical Fiber Connector," the Specification name(s) and/or number(s), and the date of the Specification(s).

For optical fiber cable assemblies and optical fiber connectors which are also Listed under Optical Fiber Cable Assemblies and Connectors (QBFA), the marking includes the appropriate Listing Mark and either the text "Also Verified [Specification name(s) and/or number(s)]," or the UL Verification Mark together with the Specification name(s) and/or number(s) and the date of the Specification(s).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

OUTLET BOXES AND FITTINGS (QBPZ)

ILLUMINATED COVER PLATES FOR FLUSH-MOUNTED WIRING DEVICES (QBSA)

GENERAL

This category covers illuminated cover plates for flush-mounted wiring devices. The cover plates have integral nonreplaceable light sources, such as neon, light-emitting diode (LED) or electroluminescent panel, and are intended for installation in accordance with Article 314 of ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 514D, "Cover Plates for Flush-Mounted Wiring Devices."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Illuminated Cover Plate for Flush-mounted Wiring Devices."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

OUTLET BOXES AND FITTINGS CLASSIFIED FOR FIRE RESISTANCE (QBWY)

GENERAL

This category covers special purpose boxes for installation in floors and nonmetallic outlet boxes for installation in walls and partitions and ceilings in accordance with the provisions of ANSI/NFPA 70, "National Electrical Code" (NEC). They have shown a degree of fire resistance when installed in the particular floor(s) or wall(s) described for each Classified company. Boxes of the type Listed in UL's Electrical Construction Materials Directory have been investigated and found to comply with established electrical requirements and are so Listed.

This category includes Classifications for nonmetallic outlet and switch boxes for use in fire resistive rated wall or partition assemblies. The information provided for each Classification includes the model numbers for the Classified products, a description of the rated assemblies, the spacing limitations for the boxes and the installation details. Nonmetallic boxes should not be installed on opposite sides of walls or partitions of staggered stud construction unless Classified for use in such constructions.

Where indicated in the individual Classifications, products have also been investigated for heat and smoke release characteristics in accordance with UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces." Such products may be installed in air-handling spaces in accordance with Sec. 300.22(C) of the NEC. Authorities Having Jurisdiction should be consulted before installation.

FLOOR BOXES

Boxes for use with floors have been investigated for use with electrical receptacles fabricated of melamine, phenolic or urea materials, unless specified otherwise in the installation instructions and Classification information. Floor boxes and fittings are intended to be installed in accordance with installation instructions provided with the product.

Boxes with integral connectors for electric metallic tubing or for unthreaded rigid metallic conduit are provided with a marking on the carton to indicate the specific type or types of wiring system for which the box has been tested.

Floor boxes designated for floor installation as covered in the NEC are provided with covers and gaskets to exclude surface water and sweeping compounds that might be present in floor-cleaning operations. Those boxes intended for installation in concrete floors are frequently provided with leveling screws, threaded hubs, or both, and are provided with a marking on the carton to identify boxes of this type, such as "Floor Box" or "Floor Box, Concrete Tight," as appropriate.

WALL AND PARTITION AND CEILING BOXES

Nonmetallic outlet boxes investigated for installation in fire-resistive assemblies are provided with the appropriate Listing Mark for electrical products and other markings as described in Nonmetallic Outlet Boxes

Outlet Boxes and Fittings Classified for Fire Resistance (QBWY)—Continued

(QCMZ). Nonmetallic outlet boxes Classified for use in fire-resistive designs may have the following marking in the base of the box:



Class * hr, F, W and/or C

where * indicates the hourly rating, such as 1 hr or 2 hr and F = Floor, W = Wall and C = Ceiling.

The boxes are Classified for use in certain fire-resistive designs when installed in accordance with the details described for each Classified company. Any Listed metallic or nonmetallic cover is suitable for use with these nonmetallic boxes.

RELATED PRODUCTS

For information on related products, see Fire Resistance Ratings – ANSI/UL 263 (BXUV).

Outlet boxes that comply with established electrical requirements are Listed under Metallic Outlet Boxes (QCIT) and Nonmetallic Outlet Boxes (QCMZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 263, "Fire Tests of Building Construction and Materials," and Supplement SB ("Nonmetallic Boxes for Installation in Fire Resistance Rated Wall and Partition Assemblies") of ANSI/UL 514C, "Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers."

UL MARK

The Classification Mark of UL on the product or on each UL Classified steel floor and form unit with factory-installed floor boxes, or the UL symbol on the product and the Classification Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

OUTLET BOXES AND FITTINGS CLASSIFIED FOR FIRE RESISTANCE

DESIGN NOS. _____

SEE PRODUCT CATEGORY IN UL FIRE RESISTANCE DIRECTORY

Control No. _____

Where indicated in the individual Classifications, products may be marked "Suitable for use in air-handling spaces in accordance with Sec. 300.22(C) of the National Electrical Code" when investigated to determine suitability for such use.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

METALLIC OUTLET BOXES (QCIT)

GENERAL

This category covers metallic mud rings, flush device boxes, conduit bodies, conduit boxes, floor boxes, outlet boxes, outlet box hoods, special-purpose boxes, extension rings, covers, and cover plates for flush-mounted wiring devices, intended for installation in accordance with Article 314 of ANSI/NFPA 70, "National Electrical Code" (NEC). These products are also intended for installation and use in accordance with the following information.

MUD RINGS

A mud ring positions a flush-mounted wiring device flush with the finished wall surface. Mud rings may be provided with either a fixed or adjustable depth sleeve.

EXTENSION RINGS

Extension rings are suitable for extending properly secured flush- or surface-mounted boxes. One or more extensions may be used. An extension ring is intended to increase the box depth, volume, or both.

USE IN FIRE-RATED ASSEMBLIES

Certified single- and double-gang metallic outlet and switch boxes with metallic or nonmetallic cover plates may be used in bearing and nonbearing

Metallic Outlet Boxes (QCIT)—Continued

wood stud and steel stud walls with ratings not exceeding 2 h. These walls have gypsum wallboard facings similar to those shown in Design Nos. U301, U411 and U425, as covered under Fire Resistance Ratings – ANSI/UL 263 (BXUV). The boxes are intended to be fastened to the studs with the openings in the wallboard facing cut so that the clearance between the boxes and the wallboard does not exceed 1/8 in. The boxes are intended to be installed so that the surface area of individual boxes does not exceed 16 sq in, and the aggregate surface area of the boxes does not exceed 100 sq in per 100 sq ft of wall surface.

Boxes located on opposite sides of walls or partitions are intended to be separated by a minimum horizontal distance of 24 in. This minimum separation distance between the boxes may be reduced when Wall-opening Protective Materials (QCSN) are installed according to the requirements of their certification.

The boxes are not intended to be installed on opposite sides of walls or partitions of staggered stud construction unless Wall-opening Protective Materials (QCSN) are installed with the boxes in accordance with certification requirements for the protective materials.

Certified metallic outlet and switch boxes with metallic or nonmetallic cover plates may be used in floor-ceiling and roof-ceiling assemblies with ratings not exceeding 2 h when these assemblies have gypsum wallboard membranes. The boxes are intended to be fastened to the joists with the openings in the wallboard facing cut so that the clearance between the boxes and the gypsum wallboard does not exceed 1/8 in. The boxes are intended to be installed so that the surface area of individual boxes does not exceed 16 sq in, and the aggregate surface area of the boxes does not exceed 100 sq in per 100 sq ft of ceiling surface.

CONDUIT BODIES

Conduit bodies that are provided with a volume marking can enclose splices, taps or devices. Conduit bodies that are not provided with a volume marking are covered under Conduit Fittings (DWTI). Conduit bodies certified for use with specific conduit body covers and conduit body covers certified for use with specific conduit bodies are covered under Conduit Bodies and Covers Certified for Use with Specified Equipment (QCKW).

CONCENTRIC OR ECCENTRIC KNOCKOUTS

All boxes with concentric or eccentric knockouts have been investigated for bonding and are suitable for bonding without any additional bonding means around concentric (or eccentric) knockouts where used in circuits above or below 250 V, and may be marked as such.

CLAMPS

Boxes may or may not be provided with clamps. When clamps are provided, the carton is marked to indicate the type of wiring system or combination of systems for which they have been tested. The clamps are marked with the following letters or combinations thereof to indicate that they are suitable for use with armored cable ("A"); flexible metal conduit – "E," nonmetallic-sheathed cable – "N," or flexible tubing (loom) – "T." Clamps suitable for Type MC metal-clad cable are marked "MCI" for metal-clad interlocking armored cable, "MCI-A" for metal-clad interlocking armor ground cable, "MCS" for metal-clad continuous smooth-sheath cable, and "MCC" for metal-clad continuous corrugated-sheath cable. If suitable for all seven types, the clamp is marked "ALL." Clamps suitable for nonmetallic-sheathed cable are also suitable for multiconductor underground feeder and branch circuit cable where used in dry locations.

Clamps have been tested for securing only one cable per clamp, except multiple section clamps are considered suitable for securing one cable under each section of the clamp, each cable entering a separate knockout.

GROUNDING

Clamps for armored cable, flexible metal conduit, metal-clad interlocking armor ground cable, metal-clad continuous smooth-sheath cable, or metal-clad continuous corrugated-sheath cable are considered suitable for grounding where installed in accordance with the NEC.

FIXTURE/LUMINAIRE SUPPORT

A box, with or without a bracket or bar hanger, intended for support of a fixture/luminaire weighing 50 lbs or less is marked "FOR FIXTURE/LUMINAIRE SUPPORT" on the carton to indicate that the box is intended for fixture/luminaire support. A box, with or without a bracket or bar hanger, intended for support of a fixture/luminaire weighing more than 50 lbs is marked with the weight of the fixture/luminaire to be supported. Metallic device boxes and device plaster rings have not been investigated for support of a ceiling fixture/luminaire unless marked for use in ceilings, walls, and with the weight of the product to be supported. Metallic device boxes or metallic device boxes intended to be installed in an existing structure have been investigated for the support of utilization equipment weighing not more than 6 lbs.

INTEGRAL CONNECTORS

Boxes with integral connectors for electrical metallic tubing or for unthreaded rigid metallic conduit are provided with a marking on the carton to indicate the specific type or types of wiring system for which the boxes have been tested.

CEILING-SUSPENDED-FAN SUPPORT

Metallic Outlet Boxes (QCIT)—Continued

A box, or a box with a bracket or bar hanger intended for support of a ceiling-suspended (paddle) fan weighing 35 lbs or less is marked "ACCEPTABLE FOR FAN SUPPORT" on the product. A box, or a box with a bracket or bar hanger intended for support of a ceiling-suspended (paddle) fan weighing more than 35 lbs but not more than 70 lbs is marked "ACCEPTABLE FOR FAN SUPPORT OF 70 LBS OR LESS" on the product. A box, or a box with a bracket or bar hanger intended for support of a ceiling-suspended (paddle) fan is acceptable for use with a fixture/luminaire when provided with the above fixture/luminaire-support markings.

CONCRETE TIGHT

All metal boxes, except aluminum alloy boxes, are provided with corrosion protection suitable for installation in concrete. Aluminum alloy boxes covered under this category are not considered acceptable for installation in concrete or cinder fill unless protected by asphalt paint or the equivalent. Boxes designated as "concrete tight" may have no means of support other than the concrete and often accommodate covers at top and bottom.

FLOOR BOXES

Floor boxes designed for floor installation as covered in the NEC are provided with covers and gaskets to exclude surface water and sweeping compounds that might be present in floor cleaning operations. Covers with gaskets may be shipped separately from the boxes. Both products are provided with installation instructions. Those boxes intended for installation in concrete floors are frequently provided with leveling screws, threaded hubs or both, and are provided with a marking on the carton to identify boxes of this type such as "Floor Box Cover," "Floor Box" or "Floor Box, Concrete Tight," as appropriate. Floor boxes may be provided with wiring devices.

WET AND DAMP LOCATIONS

Boxes and covers intended for use in wet locations as defined by the NEC are marked "Wet Location." Damp location boxes and covers are intended to be so located or equipped as to prevent water from entering or accumulating in the box and are marked "Damp Location." Boxes with threaded conduit hubs will normally prevent water from entering except for condensation within the box or connected conduit.

Box and device cover combinations, and flush device covers that provide protection from the weather only when the cover is closed, are marked "Wet Location Only When Cover Closed" and may be marked "Damp Location." Outlet box hoods intended for use in damp or wet locations are marked for each location and may be marked "Extra-Duty."

ENVIRONMENTAL INSTALLATION

Boxes may be marked with the environmental Enclosure Type number (1, 2, 3, 3R, etc.) as described in Electrical Equipment for Use in Ordinary Locations (AALZ).

Boxes marked with Enclosure Type 3X or "Corrosion Protection" provide the same level of protection as Type 3 enclosures, and are provided with an additional level of corrosion protection for the enclosure.

RELATED PRODUCTS

Outlet box assemblies that include certified outlet boxes and one or more of the following certified parts: wiring device, mud ring, cover plate, wet-location gasket and cover plate, wet-location gasket and outlet box hood, or other factory-assembled parts, are covered under Wiring Assemblies (QQYZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 514A, "Metallic Outlet Boxes," and ANSI/UL 514D, "Cover Plates for Flush-Mounted Wiring Devices."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Outlet Box," "Outlet Box and Cover," "Extension Ring," "Flush Device Box," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Conduit Bodies and Covers Classified for Use with Specified Equipment (QCKW)

GENERAL

This category covers Listed conduit body covers Classified for use with specified Listed conduit bodies, and Listed conduit bodies Classified for use with specified Listed conduit body covers, in accordance with the details described under **UL MARK**.

These products have been investigated for use in wet locations.

RELATED PRODUCTS

Products Classified under this category are also Listed under Metallic Outlet Boxes (QCTI).

ADDITIONAL INFORMATION

For additional information, see Metallic Outlet Boxes (QCTI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 514A, "Metallic Outlet Boxes."

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the complete Listing Mark for Metallic Outlet Boxes (QCTI) and the following additional information:

**ALSO CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
FOR USE WITH UL LISTED [CONDUIT BODY] [CONDUIT BODY COVER]**

CATALOG NO. ___, [LISTEE'S NAME]

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

NONMETALLIC OUTLET BOXES (QCMZ)

GENERAL

This category covers nonmetallic flush device boxes, conduit bodies, conduit boxes, outlet boxes, outlet box and bar hanger assemblies, outlet box hoods, special-purpose boxes, extension rings, covers, and cover plates for flush-mounted wiring devices, intended for installation in accordance with Article 314 of ANSI/NFPA 70, "National Electrical Code." These products are also intended for installation and use in accordance with the following information.

BOX EXTENDERS

Box extenders are components installed in or on a box that is mounted in a finished structure intended to extend the electrical enclosure up to the new finished surface. The box extender rests on the edge of the existing box (fixed depth) or extends into the box (adjustable depth). The flange of the box extender, if provided, rests on the finished surface.

EXTENSION RINGS

Extension rings are suitable for extending properly secured flush- or surface-mounted boxes. One or more extensions may be used. An extension ring is intended to increase the box depth, volume, or both.

CONDUIT BODIES

Conduit bodies that are provided with a volume marking can enclose splices, taps or devices. Conduit bodies that are not provided with a volume marking are covered under Conduit Fittings (DWTT). Conduit bodies certified for use with specific conduit body covers and conduit body covers certified for use with specific conduit bodies are covered under Conduit Bodies and Covers Certified for Use with Specified Equipment (QCKW).

CLAMPS

Boxes may or may not be provided with clamps. When clamps are provided, the carton is marked to indicate the type of wiring system or combination of systems for which they have been tested. The clamps are marked with the following letters or combinations thereof to indicate that they are suitable for use with nonmetallic-sheathed cable "N" or flexible tubing (loom) "T." Clamps suitable for nonmetallic-sheathed cable are also suitable for multiconductor underground feeder and branch circuit cable where used in dry locations unless the box or smallest unit carton is marked "Nonmetallic Sheathed Cable Only." Clamps have been tested for securing only one cable per clamp, except multiple section clamps are considered suitable for securing one cable under each section of the clamp, each cable entering a separate knockout. All clamps are removed before the volume of the box is to be determined.

Boxes intended for use with nonmetallic-sheathed cable or open wiring are suitable for use with cable or wire rated 90°C or less, unless marked for a higher rated wire in degrees centigrade.

SINGLE-GANG BOX

Nonmetallic Outlet Boxes (QCMZ)—Continued

A box nominally 2-1/4 by 4 in. or smaller is intended for one or more nonmetallic-sheathed cables to enter through a single- or multiple-stage knockout opening.

FOR USE WITH RIGID NONMETALLIC CONDUIT

Nonmetallic boxes suitable for use with rigid nonmetallic conduit are provided with a marking on the carton to indicate the intended use, such as "For [Specific Type] Conduit." Such boxes, when so marked on the box or carton and provided with installation instructions, are intended for support by the specified conduit. Such boxes are inherently resistant to atmosphere containing common industrial corrosive agents and will withstand vapors or mists of caustic pickling acids, plating baths, and hydrofluoric and chromic acids. Nonmetallic boxes for use with rigid PVC conduit are suitable for use with wire rated 90°C or less.

Nonmetallic boxes suitable for use with rigid nonmetallic conduit are not intended to support equipment or to accommodate heat producing equipment.

FIXTURE/LUMINAIRE SUPPORT

A nonmetallic box, with or without a bracket or bar hanger, intended for support of a fixture/luminaire weighing 50 lbs or less is marked "FOR FIXTURE/LUMINAIRE SUPPORT" on the carton. A nonmetallic box, with or without a bracket or bar hanger, intended for support of a fixture/luminaire weighing more than 50 lbs. is marked with the weight of the fixture/luminaire to be supported. Nonmetallic boxes and device plaster rings have not been investigated for support of a ceiling fixture/luminaire unless marked for use in ceilings, walls, and with the weight of the product to be supported. Nonmetallic device boxes or nonmetallic device boxes intended to be installed in an existing structure have been investigated for the support of utilization equipment weighing not more than 6 lbs.

CEILING-SUSPENDED-FAN SUPPORT

A box, or a box with a bracket or bar hanger intended for support of a ceiling-suspended (paddle) fan weighing 35 lbs or less is marked "ACCEPTABLE FOR FAN SUPPORT" on the product. A box, or a box with a bracket or bar hanger intended for support of a ceiling-suspended (paddle) fan weighing more than 35 lbs. but not more than 70 lbs. is marked "ACCEPTABLE FOR FAN SUPPORT OF 70 lbs OR LESS" on the product. A box, or a box with a bracket or bar hanger intended for support of a ceiling-suspended (paddle) fan is acceptable for use with a fixture/luminaire when provided with the above fixture/luminaire support markings.

CONCRETE TIGHT

Boxes designated as "concrete tight" may have no means of support other than the concrete and often accommodate covers at top and bottom.

FLOOR BOXES

Floor boxes designed for floor installation as covered in ANSI/NFPA 70, "National Electrical Code" (NEC), are provided with covers and gaskets to exclude surface water and sweeping compounds that might be present in floor-cleaning operations. Covers with gaskets may be shipped separately from the boxes. Both products are provided with installation instructions. Those boxes intended for installation in concrete floors are frequently provided with leveling screws, threaded hubs, or both and are provided with a marking on the carton to identify boxes of this type such as, "Floor Box Cover" or "Floor Box, Concrete Tight" as appropriate. Floor boxes may be provided with wiring devices.

WET AND DAMP LOCATIONS

Boxes and covers intended for use in wet locations as defined by the NEC are marked "Wet Location." Damp location boxes and covers are intended to be so located or equipped as to prevent water from entering or accumulating in the box and are marked "Damp Location." Boxes with threaded conduit hubs will normally prevent water from entering except for condensation within the box or connected conduit.

Box and device cover combinations, and flush device covers that provide protection from the weather only when the cover is closed, are marked "Wet Location Only When Cover Closed" and may be marked "Damp Location." Outlet box hoods intended for use in damp or wet locations are marked for each location and may be marked "Extra-Duty."

RELATED PRODUCTS

Outlet box assemblies that include certified outlet boxes and one or more of the following certified parts: wiring device, mud ring, cover plate, wet-location gasket and cover plate, wet-location gasket and outlet box hood, or other factory-assembled parts, are covered under Wiring Assemblies (QQYZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 514C, "Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers," and ANSI/UL 514D, "Cover Plates for Flush-Mounted Wiring Devices."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method pro-

Nonmetallic Outlet Boxes (QCMZ)—Continued

vided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Outlet Box," "Outlet Box and Cover," "Extension Ring," "Flush Device Box," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

OUTLET BUSHINGS AND FITTINGS (QCRV)

GENERAL

This category covers supports for outlet and flush device boxes; bushings for use in metal studs; fittings for use in or on outlet and flush device boxes, such as knockout reducers, seals and insulating inserts, and cord-grip attachments; insulating gaskets used behind cover plates for flush-mounted wiring devices to stop drafts; pulling grips, strain-relief grips and support grips; locknuts for conduit; sealing gaskets (washers), sealing rings, service-entrance heads for rigid conduit or electrical metallic tubing; cable riser supports; and bushings for use on the ends of rigid or flexible conduit, or electrical metallic tubing, where a change to open wiring is made.

All male threaded fittings have only been investigated for use with locknuts.

Service-entrance heads or hoods are intended to be used on rigid conduit or electrical metallic tubing that is mounted with the conductor openings facing toward the ground. Service-entrance heads or hoods are suitable for outdoor use and in wet locations.

Armored Cable Bushings — These bushings are used on armored cable between the conductors and the outer armor. They are a readily distinguishable bright color such as red, orange or yellow.

Bushings — These bushings are suitable for temperatures of 150°C if they are black or brown in color, 90°C if they are any other color unless specifically marked for a higher temperature. Other bushings are covered under Insulating Bushings (NZMT) and Conduit Fittings (DWTI). Service-entrance heads for use with service-entrance cable are covered under Service-entrance Cable Fittings (TYZX). Temporary wiring, such as round flexible cables or cords may be secured by the use of a connector suitable for use with flexible cord.

Floor Outlet Fittings — Floor outlet fittings are for use in concrete floors for coupling short lengths of exposed conduit to concealed systems when so installed that floor couplings do not come below surface of floor in which they are embedded and subject to the following restrictions: Elbow to be used only where conduit wires pass through fitting without splice, joint, or tap within fitting, and only where no more than one elbow is used in any conduit run. Tees to be used only where conductors are not drawn in until after main conduit installation is complete. If splices, joints, or taps are used in tees, conductors are intended to be looped that upon removing exposed conduit at floor coupling, splices, joints, or taps can readily be disconnected without interfering with other wiring within fitting.

Sealing Gaskets (Washers) — Sealing gaskets are intended for use with threaded rigid metal conduit and intermediate metal conduit with one sealing gasket on the outside and an ordinary locknut or sealing locknut on the opposite side of the enclosure for wet locations or liquid-tight applications. Sealing gaskets may also be used with certified wet location or liquid-tight fittings where so marked on the fitting carton.

Sealing Rings — Sealing rings have a sealing material contained within a metal retaining ring. Sealing rings are intended for installation only between a threaded fitting and the outside of an enclosure with the fitting secured by a locknut on the inside the enclosure. Sealing rings are intended for wet locations or liquid-tight applications where so marked on the product or product packaging.

Reusability — Bushings and fittings have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction.

ENVIRONMENTAL ENCLOSURE TYPE RATINGS

Each fitting may be marked with one or more of the following Environmental Enclosure Type ratings for which it was investigated: Type 1, 2, 3R, 3S, 4, 4X, 5, 6, 6P, 12, 12K, 13. The intended uses for each Environmental Enclosure Type are indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

GROUNDING

Metal reducing washers are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with ANSI/NFPA 70, "National Electrical Code." Reducing washers are

Outlet Bushings and Fittings (QCRV)—Continued

intended for use with metal enclosures having a minimum thickness of 0.053 in. for non-service conductors only. Reducing washers may be installed in enclosures provided with concentric or eccentric knockouts, only after all of the concentric and eccentric rings have been removed. However, those enclosures containing concentric and eccentric knockouts that have been certified for bonding purposes may be used with reducing washers without all knockouts being removed.

CARTON MARKINGS

Fittings for use with flexible cords and marked "Liquid-Tight" on the carton indicates suitability for the use where directly exposed to oil spray or to rain.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 514A, "Metallic Outlet Boxes," ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings," ANSI/UL 514D, "Cover Plates for Flush-Mounted Wiring Devices," and ANSI/UL 651, "Schedule 40 and 80 Rigid PVC Conduit and Fittings."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the small unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Outlet Bushing," "Outlet Fitting," "Offset Adapter," "Bar Hanger," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WALL OPENING PROTECTIVE MATERIALS (QCSN)

USE AND INSTALLATION

This category covers proprietary compositions that are used to maintain the hourly ratings of fire-resistive walls and partitions containing flush-mounted devices, such as outlet boxes, electrical cabinets, and mechanical cabinets. The individual certifications indicate the specific applications and the method of installation for which the materials have been investigated.

Electrical devices are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 263, "Fire Tests of Building Construction and Materials."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

WALL OPENING PROTECTIVE MATERIAL

FIRE RESISTANCE CLASSIFICATION

SEE PRODUCT CATEGORY

IN UL FIRE RESISTANCE DIRECTORY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

OUTLET CIRCUIT TESTERS (QCYU)

GENERAL

This category covers portable devices with fixed attachment plug blades, or probes attached to flexible leads, used to indicate various wiring condi-

PRODUCT CATEGORIES BY CATEGORY CODE

tions in 15 or 20 A branch circuits by a pattern of lights or other similar means along with markings or instructions to identify the probable wiring conditions which cannot be determined by the tester.

The devices may include provisions for checking the functions of a ground-fault circuit interrupter (GFCI) connected to the branch circuit, or for indicating that a branch circuit is connected to an arc-fault circuit interrupter (AFCI).

AFCI indicators operate by producing a waveform similar to an arc fault. Since these devices cannot produce an actual arc fault, an AFCI indicator may not trip every AFCI. AFCI indicators are provided with markings or instructions that state the following or equivalent: "**CAUTION:** AFCIs recognize characteristics unique to arcing, and AFCI indicators produce characteristics that mimic some forms of arcing. Therefore the indicator may provide a false indication that the AFCI is not functioning properly. If this occurs, recheck the operation of the AFCI using the test and reset buttons. The AFCI button test function will demonstrate proper operation."

These devices are not intended for use as comprehensive diagnostic instruments.

RELATED PRODUCTS

Ground-continuity-indicating devices constructed integral with cord-connector bodies for use on construction sites are covered under Attachment Plugs, Fuseless (AXUT) as "cord-connector bodies."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1436, "Outlet Circuit Testers."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Tester."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PACKAGED PUMPING SYSTEMS (QCZJ)

GENERAL

This category covers fluid handling systems consisting of pumps, electric motors, frequency drives, control valves, gauges and piping mounted on a structural steel base. They are used for plumbing boosters, heat transfer, hot water heating, HVAC chilled and hot water packages, irrigation, boiler feed and condensate packages, and similar applications.

This category also covers fountain pumping systems intended for connection to permanently-installed architectural and floating fountains. They are intended for installation in accordance with Article 680 or 682 of ANSI/NFPA 70, "National Electrical Code" (NEC). If provided with a control panel, its nameplate includes "Industrial Control Panel for Floating Fountain," "Industrial Control Panel for Permanently Installed Fountain" or "Fountain Control Panel."

RATINGS

Packaged pumping systems are rated 600 V or less. The supply input is rated in full load amperes, voltage, number of phases, frequency, and the rating of the largest motor load.

The system and components of the system are intended to be used within the rated working pressure and with the appropriate liquids in accordance with system markings.

SPECIAL CONSIDERATIONS

These pumping systems have not been investigated for the handling of hazardous materials or for use in hazardous (classified) locations as defined in the NEC.

RELATED PRODUCTS

Systems covered under this category may also be covered under Drinking Water System Components (FDNP). The investigation of drinking water system components is conducted with respect to contaminants that can be introduced into the drinking water supply from their base metal alloy, plastic resin, or other nonmetallic parts such as gaskets, seals, coatings, adhesives, filter media, cement linings or the like.

Systems investigated together with air conditioning and refrigeration equipment are covered under Heating and Cooling Equipment (LZFE) or Specialty Refrigeration Equipment (SROT).

Pumping equipment intended for fire service is covered under Fire Pump Motors (QXZF).

Pumps intended for use with combustible or flammable liquids, corrosive liquids, or aqueous solutions containing corrosive materials are covered under Power-operated Pumps (RBOG), or Pumps, Power Operated, Flammable Liquid (RCRX).

Prepackaged combinations of components, such as pumps, filters, heaters, blowers, lights and controls, intended for use with field-supplied hot tubs or spas are covered under Hot Tub and Spa Equipment Assemblies (WBYQ).

Pumps investigated for use with or in proximity to swimming pools or spas are covered under Pumps (WCSX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 508, "Industrial Control Equipment," ANSI/UL 778, "Motor-Operated Water Pumps," and UL 508A, "Industrial Control Panels."

The basic standard used to investigate packaged pumping systems for heating and cooling equipment in this category is ANSI/UL 1995, "Heating and Cooling Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Packaged Pumping System" or "Packaged Fountain Pumping System."

The Listing Mark covers only the equipment mounted to the common structural frame.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PAINTING EQUIPMENT, AIR COMPRESSORS AND VACUUM PUMPS (QDFT)

This category covers painting equipment, air compressors and vacuum pumps intended for use on nominal system voltages of 600 V and less, except that where the appliances are driven by universal type motors or electromagnetic mechanisms the scope is limited to appliances rated for use on nominal system voltages of 250 V or less. These appliances are cord-connected or provided with means for field wiring connections.

This equipment is intended for household, commercial or industrial use as defined by ANSI/NFPA 70, "National Electrical Code" (NEC).

Paint sprayers present certain inherent hazards when flammable paint or liquid are sprayed, which cannot be guarded against by specific design features. The instructions and warnings supplied with and applicable to each piece of equipment should be carefully observed.

Appliances specified as double insulated are constructed with a special insulating system in lieu of grounding to comply with the provisions of the NEC. Such appliances are distinctively marked "Double-Insulated" or "Double Insulation."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMPRESSORS, VACUUM PUMPS AND PNEUMATIC PAINT SPRAYERS (QDGS)

USE AND INSTALLATION

This category covers air compressors and vacuum pumps, including pneumatic-type paint sprayers.

Tank-type compressors of 3 hp or less or 30 gallons and less may employ tanks that are not certified by the American Society of Mechanical Engineers and are not marked with "U" or "UM," but have been investigated by UL for the application.

Products can be cord-connected or provided with means for permanent connection in the field. Permanently connected products are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

REBUILT PRODUCTS

This category also covers compressors, vacuum pumps and pneumatic paint sprayers that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing

Compressors, Vacuum Pumps and Pneumatic Paint Sprayers (QDGS)—Continued

skills. Rebuilt compressors, vacuum pumps and pneumatic paint sprayers are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt compressors, vacuum pumps and pneumatic paint sprayers are subject to the same requirements as new compressors, vacuum pumps and pneumatic paint sprayers.

FACTORS NOT INVESTIGATED

This equipment has not been investigated for use as medical and dental equipment, or heating, air conditioning or refrigeration equipment.

RELATED PRODUCTS

High-pressure paint sprayers, paint mixers and paint pigment dispensers are covered under Painting Equipment (QDIQ).

ADDITIONAL INFORMATION

For additional information, see Painting Equipment, Air Compressors and Vacuum Pumps (QDFT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1450, "Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Painting Equipment," or other appropriate product name as shown in the individual Listings.

For rebuilt products, the word "Rebuilt" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PAINTING EQUIPMENT (QDIQ)

USE

This category covers motor-operated equipment used for the preparation or application of paint, such as paint mixers, paint pigment dispensers, paint rollers and high-pressure airless paint sprayers.

Products can be cord-connected or provided with means for permanent connection in the field. Permanently connected products are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

REBUILT PRODUCTS

This category also covers painting equipment that is rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt painting equipment is rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt painting equipment is subject to the same requirements as new painting equipment.

RELATED PRODUCTS

Paint heaters are covered under Heaters, Industrial and Laboratory (KQLR).

Pneumatic paint sprayers are covered under Compressors, Vacuum Pumps and Pneumatic Paint Sprayers (QDGS).

ADDITIONAL INFORMATION

For additional information, see Painting Equipment, Air Compressors and Vacuum Pumps (QDFT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1450, "Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Painting Equipment" or other appropriate product name as shown in the individual Listings.

For rebuilt products the word "Rebuilt" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Painting Equipment (QDIQ)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PAINT SPRAY AND FINISHING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (QEEA) PAINT-SPRAY BOOTHS WITHOUT FIRE-PROTECTION SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (QEFA)

USE

This category covers paint spray booths for liquid and powder coating finishing processes as defined in Article 516 of NFPA 70, "National Electrical Code" (NEC) and in NFPA 33, "Spray Application Using Flammable and Combustible Materials." Some of the booths may alternatively be used for drying, and may utilize electric heating, gas, gas-oil, or an oil-fired heating system. The type of heating employed is indicated in the individual Listings.

These paint spray booths are intended for field erection indoors in accordance with instructions furnished by the manufacturer and the information marked on the equipment. They are intended to be installed and used in accordance with applicable requirements in NFPA 33 and Article 516 of the NEC. Paint spray booths located within a commercial garage are to be installed as defined in Article 511 of the NEC.

FIRE PROTECTION

Paint spray booths in this category are not provided with a factory installed automatic fire protection system. A UL Listed fire protection system is intended to be provided by the installer and approved by the Authority Having Jurisdiction prior to operation of the booth.

COATING MATERIALS

These paint spray booths are intended for spray operations using a single type of coating material. Due to the possibility of spontaneous ignition, different types of coating materials should not be alternately used unless all deposits of the first used material are removed from the booth and ducts, and all paint contaminated filters are replaced or cleaned prior to spraying with the second type of coating material.

The toxicity of coating materials that may be used and the ability of the spray booth to provide protection for the painter and/or booth operator from coating material fumes have not been evaluated. Proper precautions as recommended by the paint manufacturer should be followed.

PRODUCT MARKINGS

The main product nameplate for products in this category includes the statement: "A UL Listed Automatic Sprinkler System or other Listed Automatic Extinguishing System shall be provided by the installer and approved by the Authority Having Jurisdiction."

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in NFPA 33, "Spray Application Using Flammable and Combustible Materials."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names and information, as appropriate: (A) "Paint Spray Booth Without Fire Protection System for Automobile Refinishing," (B) "Paint Spray Booth Without Fire Protection System" or (C) "Paint Spray Booth Without Fire Protection System for Use Only with (Company Name) Labeled (Gas) (Gas-Oil) (Oil) Burner Model(s). Maximum Input (BTU Per Hour) (Gals Per Hour). Refer to Burner Nameplate for Control and Fuel Specifications."

A paint spray booth that includes a burner as part of the factory-furnished assembly bears a Listing Mark with the product name and information as outlined in (A) or (B).

A paint spray booth assembly intended for installation of the burner in the field bears a Listing Mark with the product name and information similar to the text in (C). The burner bears a separate Listing Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PAINT-SPRAY BOOTHS WITH FIRE-PROTECTION SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (QEFY)

USE

This category covers paint spray booths for liquid and powder coating finishing processes as defined in Article 516 of NFPA 70, "National Electrical Code" (NEC) and in NFPA 33, "Spray Application Using Flammable and Combustible Materials." Some of the booths may alternatively be used for drying, and may utilize electric heating, gas, gas-oil, or an oil-fired heating system. The type of heating employed is indicated in the individual Listings.

These paint spray booths are intended for field erection indoors in accordance with instructions furnished by the manufacturer and the information marked on the equipment. They are intended to be installed and used in accordance with applicable requirements in NFPA 33 and Article 516 of the NEC. Paint spray booths located within a commercial garage are to be installed as defined in Article 511 of the NEC.

FIRE PROTECTION

Paint spray booths are provided with either (1) an integral engineered fire extinguishing system that must be regularly inspected and/or recharged or (2) with automatic sprinklers that are connected to a separate water supply in accordance with NFPA 13, "Installation of Sprinkler Systems."

COATING MATERIALS

These paint spray booths are intended for spray operations using a single type of coating material. Due to the possibility of spontaneous ignition, different types of coating materials should not be alternately used unless all deposits of the first used material are removed from the booth and ducts, and all paint contaminated filters are replaced or cleaned prior to spraying with the second type of coating material.

The toxicity of coating materials that may be used and the ability of the spray booth to provide protection for the painter and/or booth operator from coating material fumes have not been evaluated. Proper precautions as recommended by the paint manufacturer should be followed.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in NFPA 33, "Spray Application Using Flammable and Combustible Materials."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names and information, as appropriate: (A) "Paint Spray Booth for Automobile Refinishing," (B) "Paint Spray Booth" or (C) "Paint Spray Booth for Use Only with (Company Name) Labeled (Gas) (Gas-Oil) (Oil) Burner Model(s). Maximum Input (BTU Per Hour) (Gals Per Hour). Refer to Burner Nameplate for Control and Fuel Specifications."

A paint spray booth that includes the burner as part of the factory-furnished assembly bears a Listing Mark with the product name and information as outlined in (A) or (B).

A paint spray booth assembly intended for installation of the burner in the field bears a Listing Mark with the product name and information similar to the text in (C). The burner bears a separate Listing Mark.

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PANELBOARDS (QEUY)

USE, INSTALLATION AND MARKINGS

This category covers lighting and power panelboards rated 600 V or less. Panelboards are intended for mounting in cabinets, cutout boxes or enclosures designed for the purpose. The enclosure may be provided with the panel or provided separately. Only panelboards marked to indicate that they are for use in specific enclosures (identified by either catalog number or specific dimensional information) and panelboards labeled as "Enclosed Panelboards" have been investigated to determine that wiring space is adequate, or have been investigated for short-circuit-current ratings greater than 10,000 A rms symmetrical.

Enclosed panelboards identified with an Enclosure Type designation are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Some enclosed panelboards have one or more openings for plug-in watt-hour or similar meters. Such panelboards, when marked for outdoor use have, except for the joint between the plug-in meter and opening, been investigated for rain tightness.

Some panelboards are suitable for use as service equipment and may be so marked. Such marking is part of the Certification Mark as noted below or is an integral part of other required markings. Panelboards marked to indicate that they are suitable for use as service equipment and which can be removed from the enclosure are marked to identify the specific enclosure in which they are intended to be installed. If the acceptability of such a panelboard for use as service equipment depends upon the condition of installation or use, the panelboard is marked to indicate those conditions.

Some panelboards incorporate neutrals factory bonded to the frame or enclosure. Such units are marked "Suitable Only for Use as Service Equipment."

Panelboards marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system.

Panelboards are marked with their short-circuit-current rating in rms symmetrical amps. The marking states that short-circuit ratings are limited to the lowest interrupting rating of (1) any device installed or intended to be installed therein, and/or (2) any combination series-connected device. However, for combination series-connected devices, the short-circuit-current rating marked on the panelboard may be higher than the interrupting rating of a specific circuit breaker installed or intended to be installed in the panelboard. This higher rating is valid only if the specific overcurrent devices identified in the marking are used within or ahead of the panelboard in accordance with the marked instructions.

Panelboards to which units (circuit breakers, switches, etc.) may be added in the field are marked with the name or trademark of the manufacturer and the catalog number or equivalent of those units that are intended to be installed in the field. Molded-case circuit breakers (see DIXE) may also be Classified and marked as being suitable for use in certain panelboards in place of or along with specific units marked on the panelboard.

Where in normal operation the load will continue for three hours or more, molded-case circuit breakers and fused switches, other than fused power circuit devices, should not be loaded to exceed 80% of their current rating unless the device is otherwise marked. Low-voltage ac power switching devices (see PAPU) and fused power circuit devices (see IYSR) used in panelboards are suitable for continuous use at 100% of their rating.

Some panelboards may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected are identified by a marking, such as on a wiring diagram.

These panelboards are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location. If all terminals are suitable for use with aluminum conductors as well as copper conductors, the panelboard is marked "Use Copper or Aluminum Wire." A panelboard employing terminals or main or branch circuits units, individually marked "CU-AL," is marked as noted above or "Use Copper Wire Only." The latter statement indicates that wiring space or other factors make the panelboard unsuitable for aluminum conductors.

Unless the panelboard is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14-1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger as specified in Table 310.16 of ANSI/NFPA 70, "National Electrical Code" (NEC). However, 3-wire, single-phase service entrance or feeder conductors for dwelling units may be as covered in Section 310.15(B)(6) of the NEC. Termination provisions are determined based on values provided in Table 310.16 or Section 310.15(B)(6), with no adjustment made for correction factors.

Some panelboards, constructed with interlocked main switching and overcurrent protective devices, have been investigated for use in optional standby systems in accordance with Article 702 of the NEC and are marked "Suitable for use in accordance with Article 702 of the National Electrical Code ANSI/NFPA 70," or, if provided within kit form, "Suitable for use in accordance with Article 702 of the National Electrical Code ANSI/NFPA 70 when provided with interlock kit Cat No. _____."

CLASS CTL PANELBOARDS

Circuit-limiting panelboards (known as "Class CTL" panelboards) are identified by the words "Class CTL" on the UL Certification Mark.

Class CTL panelboards incorporate physical features which, in conjunction with the physical size, configuration, or other means provided in Class CTL circuit breakers, fuseholders or fusible switches, are designed to prevent the installation of more overcurrent protective poles than that number for which the device is designed and rated.

MARINE PANELBOARDS

Some certified enclosed panelboards in this category have been investigated for use aboard marine vessels over 65 ft in length in accordance with the Electrical Engineering Regulations of the United States Coast Guard Subchapter J CG-259 (46CFR Parts 110-113). Such enclosed panelboards are identified by a Certification Mark for marine vessels over 65 ft in length.

PANELBOARDS (QEUY)

The Electrical Engineering Regulations of the United States Coast Guard classify marine enclosed panelboards as “Non-watertight,” “Drip-proof” or “Watertight.”

A “Drip-proof” marine enclosed panelboard is so constructed that falling moisture or dirt does not interfere with the successful operation of the equipment.

A “Watertight” marine enclosed panelboard is so constructed that water does not enter the enclosure when subjected to a stream of water.

External means are provided for the operation of switches or circuit breakers in “Watertight” marine enclosed panelboards.

Marine enclosed panelboards classed “Drip-proof” or “Watertight” are marked to indicate this fact.

A marine enclosed panelboard for use in corrosive locations is marked “Suitable for Use in Corrosive Locations.”

RECREATIONAL VEHICLE (RV) PANELBOARDS

Some certified enclosed panelboards in this category have been investigated for RV use only. These panelboards generally consist of a line voltage/branch circuit section that complies with ANSI/UL 67, “Panelboards.” The low-voltage compartment, including the overall enclosure for that compartment, complies with ANSI/UL 458, “Power Converters/Inverters and Power Converter/Inverter Systems for Land Vehicles and Marine Crafts,” and is intended to be installed in accordance with Article 551 of the NEC. Such enclosed panelboards are identified by a Certification Mark for RVs. RV panelboards do not have integral converter or inverter functions. Devices having combination panelboard-inverter/converter capability are covered under Power Converters/Inverters and Power Converter/Inverter Systems (QPPY).

RELATED PRODUCTS

Large single panels, frames, or assemblies of panels on which are mounted on the face, back, or both, switches, overcurrent and other protective devices, buses, and usually instruments; accessible from the rear as well as from the front and not intended to be installed in cabinets are covered under Switchboards, Dead-front (WEVZ).

Distribution equipment, the sole function of which is the automatic or nonautomatic transferring of one or more load conductor connections from one power source to another, is covered under Transfer Switches (WPTZ).

Factory-wired assemblies of industrial control equipment intended to control industrial processes are covered under Industrial Control Panels (NITW).

Distribution equipment containing only one circuit subdivision, unless also provided with a meter socket, is covered under Circuit Breakers, Molded Case and Circuit-breaker Enclosures (DIVQ).

Distribution equipment intended to serve as a means for distributing power required to operate mobile or temporarily installed equipment is covered under Power Outlets and Power Outlet Fittings (QPYV).

Factory-wired assemblies of controllers, timers, temperature-regulating equipment and the like, intended for control of equipment for use with swimming pools, hot tubs and/or spas are covered under Controls (WAWU).

Factory-wired assemblies intended for the control of architectural and floating fountains are covered under Architectural and Floating Fountains (AWEG).

Portable power distribution equipment is covered under Power Distribution Equipment, Portable (QPRW).

Devices having combination panelboard/inverter capability are covered under Power Converters/Inverters and Power Converter/Inverter Systems (QPPY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 67, “Panelboards.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Panelboard,” “Enclosed Panelboard,” “Marine, Enclosed Panelboard for Use on Vessels Over 65 Feet,” “Enclosed RV Panelboard.” The product name may include the wording “Class CTL” or “Suitable for Use as Service Equipment,” where appropriate. The product name “Enclosed Panelboard” covers both the panel and the enclosure with which it is provided.

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PANELBOARDS FOR USE IN HAZARDOUS LOCATIONS (QFIW) 333

PANELBOARDS FOR USE IN HAZARDOUS LOCATIONS (QFIW)

USE

This category covers enclosed panelboards under Class I and Class II groups of the manually operable, air-break type, employing circuit breakers having automatic overload protection.

These enclosed panelboards are intended for lighting and low-capacity power distribution.

These panelboards are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Each marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Enclosed Panelboard for Hazardous Locations.”

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PANELBOARDS, LIGHT AND POWER FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (QFKR)

USE

This category covers enclosed panelboards of the manually operable, air-break type, employing circuit breakers having automatic overload protection, and intended for lighting and low-capacity power distribution.

These panelboards are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Each marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Enclosed Panelboard for Hazardous Locations” or “Enclosed Panelboard for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PANELBOARDS, MODULAR (QFOF)

GENERAL

This category covers modular panelboards rated 600 V or less. A modular panelboard includes the following types of modules: an enclosed panelboard or a column type panelboard and one or more accessory modules, such as termination boxes, enclosed switches, circuit breaker enclosures,

PRODUCT CATEGORIES BY CATEGORY CODE

and the like. Each module has one or more openings in one or more sides of the enclosure for busbar connections or terminals for field wiring connections to other related modules. The modules are specifically designed for use with each other and, typically, they can be assembled in any sequence to meet various applications.

Each module of the system is marked for use with the other system modules, or each module is marked with a series designation common to all modules of a particular modular panelboard system.

Panelboard modules used in these modular panelboard systems are labeled "Panelboard Module" and all other system modules are labeled "Panelboard Accessory Module."

RELATED PRODUCTS

See Panelboards (QEUY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 67, "Panelboards." In addition, each accessory module is investigated to its applicable UL Standard.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Panelboard Module" or "Panelboard Accessory Module."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PASSENGER BOARDING BRIDGES (QGLA)

USE AND INSTALLATION

This category covers passenger boarding bridges intended to be installed at airport terminals. This equipment is for loading and unloading of aircraft passengers.

Passenger boarding bridges are assemblies of two or more component sections. These sections may include, but are not limited to, a rotunda, rotunda support, tunnel, rotating cab and driver or prime mover. The rotunda provides for the connection of the bridge to the airport terminal building. The cab provides for the connection of the bridge to the aircraft. The tunnel may consist of one or more sections having a telescoping construction to facilitate outward movement of the bridge to meet the aircraft. The driver or prime mover consists of one or more motors and drive train, which provide for proper positioning of the bridge to accommodate different types of aircraft and aircraft parking configurations. Bridges are provided with one or more services for connection to utility power. Power is supplied throughout the bridge by S- or SJ-type cable suitable for outdoor use and wire protected by rigid conduit with appropriate fittings or appropriate raceway. Electrical equipment within the bridge may include industrial control panels, disconnect switches, limit switches, proximity switches, luminaires, light switches, GFCI receptacles, alarms and smoke detectors. Bridges may be provided with optional equipment such as an air conditioner and power supply for the aircraft when the aircraft is parked. This equipment is normally attached to the underside of the bridge.

Bridges are completely assembled at the factory for inspection and functionality testing prior to shipping. Bridges are disassembled, shipped in sections, reassembled at the installation site and retested for functionality. As part of disassembly the air handler, aircraft power unit, and rotunda support may be removed. Bridges are provided with various control, monitoring, signaling and alarm devices to prevent movement of the bridge that would result in damage to the bridge, aircraft or airport structures and alert personnel in the vicinity of the bridge that bridge movement is imminent.

This category also covers accessories for passenger boarding bridges intended to be installed at gate areas of airport terminals. These accessories may be installed on or remote from the passenger boarding bridge. In either case they are associated with the operation of the passenger boarding bridge. The accessories include, but are not limited to, management systems for air-handling hoses, air-handling units, aircraft power units, and control, monitoring, signaling and alarm devices to regulate movement of the bridge.

This equipment is intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," and ANSI/NFPA 79, "Electrical Standard for Industrial Machinery."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Mechanical Equipment and Associated Products (AAMB).

REQUIREMENTS

The basic standards used to investigate passenger boarding bridges in this category are UL 508A, "Industrial Control Panels," and ANSI/UL 325, "Door, Drapery, Gate, Louver, and Window Operators and Systems."

The basic standard used to investigate passenger boarding bridge accessories in this category is UL 508A, in addition to the requirements contained in UL Subject 2011, "Outline of Investigation for Factory Automation Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Passenger Boarding Bridge" or "Passenger Boarding Bridge Accessory."

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PERSONAL GROOMING APPLIANCES (QGRQ)

This category covers cosmetic and grooming appliances and related equipment for use in beauty salons, barber shops, and residences. Appliances include barber chairs, curling irons, hair conditioning machines, hair dryers, manicure sets, permanent wave machines, shampoo machines, styling dryers, and untanglers (detanglers). These units are identified as to household or commercial use in the individual listings. Also see "Hair Clipping and Shaving Appliances." Heated caps, facial masks and mitts are covered under the requirements for "Heating Pads."

The physiological effects of the medicaments or cosmetic materials which may be employed in association with these appliances have not been investigated.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PERSONAL GROOMING APPLIANCES, COMMERCIAL (QGRT)

GENERAL

This category covers cosmetic and grooming appliances intended for commercial use in beauty salons, barber shops, nail care centers, and cosmetic studios. Appliances include hair dryers, barber chairs, wig and brush dryers, facial therapy units, hair spray systems, permanent wave machines, manicure sets, curling irons, cosmetology equipment, and hair conditioning machines.

FACTORS NOT INVESTIGATED

The physiological effects of the medicaments or cosmetic materials which may be employed in association with these appliances have not been investigated.

RELATED PRODUCTS

Hair clipping and shaving appliances are covered under Hair Clipping and Shaving Appliances (KEFX).

Heated caps, facial masks and mitts are covered under Heating Pads, Electric (MNUV).

Personal grooming appliances for household use are covered under Personal Grooming Appliances, Household (QGRW).

Hydromassage chairs and pedicure spas are covered under Plumbing Accessories (QMTX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1727, "Commercial Electric Personal Grooming Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illus-

PERSONAL GROOMING APPLIANCES (QGRQ)

Personal Grooming Appliances, Commercial (QGRT)—Continued

trated in the Introduction of this Directory) together with the word "LISTED," a control number, and the appropriate product name as shown in the individual Listings.

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PERSONAL SUN AND HEAT EQUIPMENT (QGRX)

GENERAL

This category covers personal sun and heat equipment of the household and commercial variety, including tanning beds and booths for use in commercial tanning salons, intended for the production of ultraviolet (sun) radiation, infrared (heat) radiation, or both.

This category also covers sun equipment provided with UV-A and UV-B fluorescent and/or high-intensity discharge (HID) lamps.

FACTORS NOT INVESTIGATED

The physiological effects, beneficial or otherwise, that may be produced by these lamps have not been investigated.

RELATED PRODUCTS

Sun and heat equipment intended for therapeutic use is covered under Medical Equipment (PIDF).

Sun and heat equipment of the household variety intended for portable use is covered under Sun and Heat Lamps (QPDY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 482, "Portable Sun/Heat Lamps." The limit for ultraviolet irradiation specified in ANSI/UL 482 is in agreement with the federal regulations specified in 21CFR1040.20, "Sun Lamp Products and Ultraviolet Lamps Intended for Use in Sun Lamp Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Sun Bed," "Tanning Booth" or "Heat Unit," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PERSONAL HYGIENE AND HEALTH CARE APPLIANCES (QGRZ)

USE

This category covers appliances, primarily cord connected, intended for use in households or similar locations, not necessarily under professional supervision, such as toothbrushes, oral irrigation appliances, denture cleaners, hydromassage units, facial cleaners, etc.

This category also covers toilet seat assemblies (including bidet seats) containing electrical features, such as heating and water-dispensing components, which are intended to connect to the already-provided plumbing accessories (toilet bowl).

FACTORS NOT INVESTIGATED

The physiological effects of the use of these appliances, beneficial or otherwise, has not been investigated.

RELATED PRODUCTS

Medical and dental equipment intended for professional use is covered under Medical Equipment (PIDF).

Other household-related equipment is covered under Personal Grooming Appliances (QGRQ), Heating Pads, Electric (MNUV), Massage and Exercise Machines (PGXX) and Personal Sun and Heat Equipment (QGRX).

Toilets are covered under Plumbing Accessories (QMTX).

Facial saunas are covered under Personal Grooming Appliances, Household (QGRW) and Personal Grooming Appliances, Commercial (QGRT).

ADDITIONAL INFORMATION

PERSONAL HYGIENE AND HEALTH CARE APPLIANCES (QGRZ)

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For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1431, "Personal Hygiene and Health Care Appliances," UL 1097, "Double Insulation Systems for Use in Electrical Equipment," and ANSI/UL 746C, "Polymeric Materials - Use in Electrical Equipment Evaluations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Personal Hygiene Appliance" or "Health Care Appliance," or the name of the specific product as shown in the individual Listings.

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PERSONAL PROTECTIVE EQUIPMENT (QGSY)

INDUSTRIAL WORKERS' PROTECTIVE APPAREL (QGVW)

Protective Clothing for Electrical Workers (QGVZ)

USE

This category covers protective clothing intended to provide minimal protection to electrical workers exposed to momentary electric arc and related thermal hazards. This wearing apparel includes design characteristics that relate to its utility and that relate specifically to protection from exposure to momentary electric arc.

ADDITIONAL INFORMATION

For additional information, see Mechanical Equipment and Associated Products (AAME).

REQUIREMENTS

The basic standard used to investigate products in this category is ASTM F1506, "Standard Performance Specification for Textile Materials for Wearing Apparel for Use by Electrical Workers Exposed to Momentary Arc and Related Thermal Hazards."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following information:

PROTECTIVE *
IN ACCORDANCE WITH THE
AMERICAN SOCIETY FOR TESTING AND MATERIALS
STANDARD PERFORMANCE SPECIFICATION FOR
TEXTILE MATERIALS FOR WEARING APPAREL FOR
USE BY ELECTRICAL WORKERS EXPOSED TO
MOMENTARY ARC AND RELATED THERMAL HAZARDS
ASTM F1506, [latest revision date]

Control No.

The Classification Mark may be abbreviated as follows:

PROTECTIVE *
IN ACCORDANCE WITH
ASTM F1506, [latest revision date]

Control No.

* GARMENT, COAT, JACKET, OVERALLS, COVERALLS, SHIRT, PANTS or HOOD

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**DISTRIBUTED GENERATION POWER
SYSTEMS EQUIPMENT (QHWJ)****AC MODULES (QHYZ)****USE AND INSTALLATION**

This category covers AC modules that provide single-phase power at 50/60 Hz when exposed to sunlight. An AC module consists of a photovoltaic module and an integral static inverter that changes dc power to ac power. AC modules may be connected in parallel and are intended for operation interactive with an electric utility supply. They have been investigated to deenergize their output upon loss of utility power.

These modules are rated up to 600 V dc input; 10 kW, 120/240 V ac or less, single-phase output.

These modules and panels are intended for mounting on buildings or on ground supported frames. Roof-mounted modules and panels are investigated for one of three mounting methods: (1) integral to the roof of a building, (2) directly on a building's roof, or (3) on a rack with a space above the roof surface.

When mounted integral to a building's roof, the module serves as the waterproof membrane. Direct-mounted panels are placed upon the building's waterproof membrane (shingles or the like). Rack-mounted styles are spaced away from the building's roof member. Rack-mounted styles may also be installed separate from buildings.

Installation of modules on or integral to a building's roof system may adversely affect the roof-covering materials' resistance to external fire exposure if the module has a lesser or no fire-resistance rating. Roof-covering materials will not be adversely affected when the modules have an equal or greater fire-resistance rating than the roof-covering material.

AC modules are marked with the maximum size of dedicated branch circuit on which they may be installed and the maximum number of modules which may be connected in parallel.

Installation of the modules, including connection between the modules and the branch-circuit disconnecting means, is intended to be in accordance with the provisions of ANSI/NFPA 70, "National Electrical Code," (NEC) including Article 690. Authorities Having Jurisdiction should be consulted as to the conformance with applicable building codes including the class of roof covering.

AC modules provided with integral ground-fault detection and interruption means required by Sec. 690-5 of the NEC are identified by a marking on the product.

FLAME CLASSES

When applicable, modules and panels are marked "Class A," "Class B" or "Class C" to denote their resistance to external fire exposure. Modules and panels that have not been identified with respect to their resistance to external fire exposure are marked "Not Fire Rated." For significance of external fire exposure classes, see UL's Roofing Materials and Systems Directory.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1741, "Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources," and ANSI/UL 1703, "Flat-Plate Photovoltaic Modules and Panels."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Utility Interactive AC Module" or "Utility Interactive Inverter Module."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**BUILDING-INTEGRATED PHOTOVOLTAIC
MODULES AND PANELS (QHJK)****USE AND INSTALLATION**

This category covers flat-plate building-integrated photovoltaic (BIPV) modules and panels intended for mounting integrally to the structural or protective surfaces of a building. BIPV modules and panels are investigated for one of three primary installation methods: (1) intended to serve as the roof, or as a majority component of the roofing system of a building, (2) intended to serve as part of a structural component of a building, such as a curtain wall, facade, atrium, skylight, etc., or (3) intended to serve as part of

**Building-integrated Photovoltaic Modules and Panels
(QHJK)—Continued**

a nonstructural component of a building, such as a curtain wall, facade, atrium, skylight, etc., which is applied extant to the primary building structure.

When intended to serve as the roof, or as a majority component of the roofing system of a building, the BIPV module serves as a primary component of the building's fire resistance and waterproofing membrane. These functions have been investigated as appropriate to the extent of those functions served. Standards used in roofing system investigations have been employed as appropriate to the nature of construction and use of the system. Roofing-type BIPV products have been investigated to those roofing standards, as appropriate to their construction and use.

When intended to serve as part of a structural component of a building, such as a curtain wall, facade, atrium, skylight, etc., the BIPV module is assumed to serve as a primary component of the building's exterior surface and is accessible from the interior space of the building. Mechanical control and protection of the system wiring should be provided as required by ANSI/NFPA 70, "National Electrical Code" (NEC), either applied to the interior of the system or integral to the support structure. BIPV modules intended to be mounted or retained within a metallic support structure have been investigated to ANSI/UL 790, "Standard Test Methods for Fire Tests of Roof Coverings," for fire-resistance classification appropriate to the installation requirements (typically Class A). The combination of BIPV modules and the intended support structure should act as structurally reliable building components in terms of both loading and fire resistance.

When intended to serve as part of a nonstructural component of a building, such as a curtain wall, facade, atrium, skylight, etc., the BIPV module is assumed not to serve as a primary component of the building's exterior surface and is not accessible from the interior space of the building. Mechanical control and protection of the system wiring should be provided as required for structural BIPV systems, and the intended support structure should act as structurally reliable control of the module system alone, as required in ANSI/UL 1703, "Flat-Plate Photovoltaic Modules and Panels." BIPV modules have been investigated to ANSI/UL 790 for fire resistance.

In either the structural or nonstructural curtain wall, facade, atrium, skylight, etc. installation mode, the BIPV panel may be identified to be suitable for use with specific UL Classified BIPV mounting systems covered under Building-integrated Photovoltaic Mounting Systems (QHJQ).

The modules and panels are marked with manufacturer and model identification. The wiring system indicates the proper terminal polarity. The installation instructions supplied provides all required electrical data, such as voltages, currents, power ratings, maximum series overcurrent device rating, and minimum acceptable diode bypassing (if needed) and appropriate means of connection between the modules and between the module array and the load, in accordance with the NEC.

Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes including the fire-resistance classification required.

FLAME CLASSES

When applicable, BIPV modules and panels intended for installation as a roofing system are marked "Class A," "Class B" or "Class C" to denote their resistance to external fire exposure. Modules and panels that are not installed as roofing systems are identified with respect to their fundamental resistance to external fire exposure, or are marked "Not Fire Rated." For significance of external fire exposure classes, see Prepared Roof-covering Materials, Formed or Molded Metal, Fiber-Cement, Plastic or Fire-retardant-treated Wood (TFXX) and Roofing Systems (TGFU).

RELATED PRODUCTS

Framed PV modules or panels that include a mounting means as part of the product and are not intended to be installed into or as part of the building surface or structure are covered under Photovoltaic Modules and Panels (QIGU).

AC modules are covered under AC Modules (QHYZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ), Building Materials (AABM) and Roofing Materials and Systems (AARM).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1703, "Flat-Plate Photovoltaic Modules and Panels."

BIPV modules and mounting systems integral to or in addition to a building's roof system are additionally investigated to ANSI/UL 790, "Standard Test Methods for Fire Tests of Roof Coverings," and/or UL 997, "Wind Resistance of Prepared Roof Covering Materials," as appropriate.

ADJUNCT SERVICE

UL provides a service for the Classification of building-integrated photovoltaic modules and panels that not only meet the appropriate requirements of UL but also have been investigated in accordance with one or more of the following design qualification standards:

IEC 61215, "Crystalline Silicon Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval"

Building-integrated Photovoltaic Modules and Panels (QHZZ)–Continued

- EN 61215, “Crystalline Silicon Terrestrial Photovoltaic (PV) Modules – Design Qualification and Type Approval”
- IEC 61646, “Thin-Film Terrestrial Photovoltaic (PV) Modules – Design Qualification and Type Approval”
- EN 61646, “Thin-Film Terrestrial Photovoltaic (PV) Modules – Design Qualification and Type Approval”
- IEC 61730-1, “Photovoltaic (PV) Module Safety Qualification – Part 1: Requirements for Construction,” and IEC 61730-2, “Photovoltaic (PV) Module Safety Qualification – Part 2: Requirements for Testing”
- EN 61730-1, “Photovoltaic (PV) Module Safety Qualification – Part 1: Requirements for Construction,” and EN 61730-2, “Photovoltaic (PV) Module Safety Qualification – Part 2: Requirements for Testing”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “BIPV Module,” “BIPV Photovoltaic Panel,” “BIPV Roofing Product,” “BIPV Module for Use with Classified Structural Support Systems,” or other appropriate product name as shown in the individual Listings.

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with IEC and/or EN design qualification standards. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following marking: “ALSO CLASSIFIED IN ACCORDANCE WITH *,” where “*” is one or more of the following:

- IEC 61215-(issue date)
- EN 61215-(issue date)
- IEC 61646-(issue date)
- EN 61646-(issue date)
- IEC 61730-1-(issue date) and IEC 61730-2-(issue date)
- EN 61730-1-(issue date) and EN 61730-2-(issue date)

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BUILDING-INTEGRATED PHOTOVOLTAIC MOUNTING SYSTEMS (QHZZ)

USE AND INSTALLATION

This category covers building-integrated photovoltaic (BIPV) mounting systems intended for use with specific Listed BIPV modules and panels (see Building-integrated Photovoltaic Modules and Panels [QHZZ]) that have been investigated for mounting integral to the structure of a building. The systems have been investigated for electric shock and fire hazards only.

Installation of BIPV modules and mounting systems integral to or in addition to a building’s roof system may adversely affect the roof-covering materials’ resistance to external fire exposure if the module and mounting system combination has a lesser or no fire-resistance rating. Roof-covering materials will not be adversely affected when the modules and mounting system have an equal or greater fire-resistance rating than the roof-covering material.

The installation of these BIPV mounting systems and related modules or panels is intended to be in accordance with ANSI/NFPA 70, “National Electrical Code,” in addition to any applicable building codes.

Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes.

FLAME CLASSES

When applicable, BIPV modules and mounting systems intended for installation as part of a roof are marked “Class A,” “Class B” or “Class C” to denote their resistance to external fire exposure. Modules, panels and mounting systems that have not been identified with respect to their resistance to external fire exposure are marked “Not Fire Rated.” For significance of external fire exposure classes, see Prepared Roof-covering Materials, Formed or Molded Metal, Fiber-Cement, Plastic or Fire-retardant-treated Wood (TFXX) and Roofing Systems (TGFU).

RELATED PRODUCTS

Rack-mounted PV modules or panels that include an integral mounting means not intended to be installed into or as part of the building structure or facade are covered under Photovoltaic Modules and Panels (QIGU).

AC modules are covered under AC Modules (QHYZ).

ADDITIONAL INFORMATION

Building-integrated Photovoltaic Mounting Systems (QHZZ)–Continued

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ), Building Materials (AABM) and Roofing Materials (AARM).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1703, “Flat-Plate Photovoltaic Modules and Panels.”

BIPV modules and mounting systems integral to or in addition to a building’s roof system are additionally investigated to ANSI/UL 790, “Standard Test Methods for Fire Tests of Roof Coverings,” and UL 997, “Wind Resistance of Prepared Roof Covering Materials,” as appropriate to the nature of construction and installation.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT NAME*]

AS TO RISK OF ELECTRIC SHOCK AND FIRE HAZARDS ONLY

+

Control No.

* BUILDING-INTEGRATED PHOTOVOLTAIC MOUNTING SYSTEM (or BIPV MOUNTING SYSTEM)

+ For products additionally investigated for resistance to external fire exposure, the Classification Mark includes the words CLASS A, CLASS B or CLASS C, as appropriate

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DISTRIBUTED GENERATION WIRING SYSTEMS AND HARNESSSES (QHZZ)

USE AND INSTALLATION

This category covers distributed generation wiring systems and harnesses intended for use with specific distributed generation equipment/devices such as photovoltaic modules, inverters, solar trackers, etc., as identified in the individual certifications.

The installation of these distributed generation wiring harnesses is intended to be in accordance with ANSI/NFPA 70, “National Electrical Code,” in addition to any applicable building codes.

Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes.

RELATED PRODUCTS

Photovoltaic modules and panels are covered under Photovoltaic Modules and Panels (QIGU).

Low-concentration flat-plate modules are covered under Flat-plate, Low-concentration Photovoltaic Modules and Panels (QHZZ).

Photovoltaic concentrators are covered under Concentrator Photovoltaic Modules and Assemblies (QICP).

AC modules are covered under AC Modules (QHYZ).

Photovoltaic junction boxes are covered under Junction Boxes for Use in Photovoltaic Modules and Panels (QIJB2).

Photovoltaic connectors are covered under Connectors for Use in Photovoltaic Systems (QIQ2).

Multi-pole distributed generation connectors are covered under Multi-pole Connectors for Use in Photovoltaic Systems (QIFA2).

Inverters and other distributed generation power converters are covered under Static Inverters, Converters and Accessories for Use in Independent Power Systems (QIKH).

Wind turbines are covered under Large Wind Turbine Generating Systems (ZGEA) and Small Wind Turbine Generating Systems (ZGEN).

Solar electric and thermal trackers are covered under Photovoltaic Solar Trackers (QIKA).

Combiner boxes are covered under Distributed Generation Power Systems Accessory Equipment (QIIO).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 9703, “Outline of Investigation for Distributed Generation Wiring Harnesses.”

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to

PRODUCT CATEGORIES BY CATEGORY CODE

DISTRIBUTED GENERATION POWER SYSTEMS
EQUIPMENT (QHWJ)

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Distributed Generation Wiring Systems and Harnesses
(QHYS)—Continued

identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Distributed Generation Wiring Harness" (or "DG Wiring Harness"), "Distributed Generation Wiring System" (or "DG Wiring System"), "Photovoltaic Wiring Harness" (or "PV Wiring Harness") or "Photovoltaic Wiring System" (or "PV Wiring System").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FLAT-PLATE, LOW-CONCENTRATION
PHOTOVOLTAIC MODULES AND PANELS
(QHJU)

USE AND INSTALLATION

This category covers flat-plate photovoltaic modules and panels that concentrate natural sunlight by a factor of 3 or less. These products use lenses and/or reflectors internal to or mounted directly on the laminate to concentrate natural sunlight on photovoltaic cells to increase output power. These products are intended to be mounted on buildings or on ground-supported frames. Roof-mounted low-concentration modules or panels are investigated for one of three mounting methods: (1) integral to the roof of a building, (2) directly on a building's roof, or (3) on a rack with a space above the roof surface. Rack-mounted styles may also be installed separate from buildings. All low-concentration photovoltaic modules and panels are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC) and model building codes.

When mounted integral to a building's roof the module serves as the waterproof membrane. Direct-mounted panels are placed upon the building's waterproof membrane (shingles or the like). Rack-mounted styles are spaced away from the building's roof member. Rack-mounted styles may also be installed separate from buildings.

Low-concentration modules and panels are intended to be connected to electrical loads, controllers, or to static inverters that convert the dc power the modules or assemblies generate to other types of power compatible with the intended loads. In addition to their voltage, current and power ratings, modules and assemblies are marked to indicate terminal polarity, and maximum series overcurrent device rating. Installation of the modules and assemblies, including connection between the modules and the assemblies and the load, static inverters or controller is intended to be in accordance with the NEC. Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes, including the class of roof covering.

FLAME CLASSES

When applicable, low-concentration modules and panels are marked "Class A," "Class B" or "Class C" to denote their resistance to external fire exposure. Modules and assemblies that have not been identified with respect to their resistance to external fire exposure are marked "Not Fire Rated." For significance of external fire exposure classes, see Roof-covering Materials (TEVT) and Roofing Systems (TGFU).

RELATED PRODUCTS

Concentrator photovoltaic modules and assemblies with sunlight concentration of greater than 3x are covered under Concentrator Photovoltaic Modules and Assemblies (QICP).

Flat-plate photovoltaic modules and panels are covered under Photovoltaic Modules and Panels (QIGU).

AC modules are covered under AC Modules (QHYZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category for the concentration of sunlight on photovoltaic cells only are contained in UL Subject 8703, "Outline of Investigation for Concentrator Photovoltaic Modules and Assemblies."

The basic standard used to investigate products in this category, with the exception of concentration of sunlight on photovoltaic cells, is ANSI/UL 1703, "Flat-Plate Photovoltaic Modules and Panels."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word

DISTRIBUTED GENERATION POWER SYSTEMS EQUIPMENT
(QHWJ)Flat-plate, Low-concentration Photovoltaic Modules and Panels
(QHJU)—Continued

"LISTED," a control number, and the product name "Low-concentration Photovoltaic Module" or "Low-concentration Photovoltaic Panel."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PHOTOVOLTAIC CHARGE CONTROLLERS
(QIBP)

USE AND INSTALLATION

This category covers permanently-connected photovoltaic charge controllers that control the state of charge of storage batteries used in photovoltaic power systems.

Photovoltaic charge controllers are rated 600 V dc or less and are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," including Article 690.

These products include photovoltaic charge controller subassemblies for field installation in a specific terminal compartment in accordance with the instructions supplied with the subassembly. The markings identify the modules in which the subassemblies may be installed or the electrical rating parameters (e.g., V_{oc} and I_{sc}) of the modules with which they are to be used. The terminal compartments, modules and subassemblies are products of the same manufacturer.

Controllers having an enclosure that is identified with an enclosure type designation or as "Rain tight" or "Rainproof" are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1741, "Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photovoltaic Charge Controller" or "Photovoltaic Charge Controller Subassembly," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CONCENTRATOR PHOTOVOLTAIC
MODULES AND ASSEMBLIES (QICP)

USE AND INSTALLATION

This category covers concentrator photovoltaic (CPV) modules and assemblies. These products use lenses and reflectors to concentrate sunlight on photovoltaic cells to increase output power. These products can be self-supporting, mounted on buildings or ground-supported frames. Roof-mounted concentrator modules or assemblies are evaluated for one of three mounting methods: (1) integral to the roof of a building, (2) directly on a building's roof, or (3) on a rack with a space above the roof surface. All CPV systems are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), and model building codes.

CPV modules and assemblies are intended to be connected to electrical loads, controllers, or to static inverters that convert the dc power the modules or assemblies generate to other types of power compatible with the intended loads. In addition to their voltage, current and power ratings, modules and assemblies are marked to indicate terminal polarity, and maximum series overcurrent device rating. Installation of the modules and assemblies, including connection between the modules and the assemblies and the load, static inverters or controller is intended to be in accordance with the NEC. Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes, including the class of roof covering.

FLAME CLASSES

When applicable, modules and assemblies are marked "Class A," "Class B" or "Class C" to denote their resistance to external fire exposure. Modules

Concentrator Photovoltaic Modules and Assemblies
(QICP)—Continued

and assemblies that have not been identified with respect to their resistance to external fire exposure are marked “Not Fire Rated.”

INSTALLATION CLASSES

The installation class for CPV modules and assemblies identifies the intended installation location as either general access areas designated “General,” or restricted access areas designated “Restricted.” General access units are able to be installed in open areas that may be contacted by the general public. Restricted access units are intended to be installed in areas that prevent general public access, such as a locked and fenced-in area.

RELATED PRODUCTS

Flat-plate photovoltaic modules and panels are covered under Photovoltaic Modules and Panels (QIGU). AC modules are covered under AC Modules (QHYZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 8703, “Outline of Investigation for Concentrator Photovoltaic Modules and Assemblies.”

ADJUNCT SERVICE

UL provides a service for the Classification of CPV modules and assemblies that not only meet the appropriate requirements of UL but also have been investigated to IEC 62108 (2007-12), “Concentrator Photovoltaic (CPV) Modules and Assemblies – Design Qualification and Type Approval.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Concentrator Photovoltaic Module” or “Concentrator Photovoltaic Assembly.”

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated to IEC 62108 (2007-12). The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following marking: “ALSO CLASSIFIED IN ACCORDANCE WITH IEC 62108 (2007-12).”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**PHOTOVOLTAIC DC ARC-FAULT CIRCUIT
PROTECTION (QIDC)****GENERAL**

This category covers direct-current (dc) photovoltaic (PV) arc-fault circuit-protection devices intended for use in solar photovoltaic electrical energy systems as described in Article 690 of ANSI/NFPA 70, “National Electrical Code.” This protection is intended to mitigate the effects of arcing faults that may pose a risk of fire ignition under certain conditions if the arcing persists.

These devices are intended for use in circuits rated 1000 V or less. They are intended for use in dc electrical systems that are supplied by a PV source, such as a module with solar cells designed to generate dc power when exposed to sunlight.

These devices have been investigated to determine their ability to recognize and react to arcing faults. They have also been investigated to determine resistance to unwanted tripping because of the presence of arcing that occurs in control and utilization equipment under normal operating conditions, and to verify that operation is not unduly inhibited by the presence of loads and circuit characteristics that may mask or attenuate unwanted arcing.

PRODUCT TYPES

Products covered under this category include PV dc arc-fault circuit-interrupters (AFCI), PV dc arc-fault detectors, PV dc interrupting devices, and inverters, converters and charge controllers with integral arc-fault circuit-interrupter protection.

All of these products are further classified as a Type 1 or Type 2 device:

Type 1 — A device intended to detect or interrupt series arcing faults.

Type 2 — A device intended to detect or interrupt both series arcing faults and parallel arcing faults.

Photovoltaic DC Arc-fault Circuit Interrupters

These devices are intended to be installed in a solar PV energy system to interrupt power delivered to an arcing fault when an arcing fault is

Photovoltaic DC Arc-fault Circuit Protection
(QIDC)—Continued

detected by the AFCI. They are intended to provide arcing protection to the PV system and wiring against the unwanted effects of arcing.

Photovoltaic DC Arc-fault Detectors

These devices are intended to provide arcing protection to the PV system and wiring against the unwanted effects of arcing by enabling a separate interruption or shorting device to interrupt power delivered to an arcing fault.

Photovoltaic DC Interrupting Devices

These devices are intended for installation in a solar PV energy system to interrupt a detected arcing fault. The device is generally enabled by another device that detects arcing, such as an arc-fault detector. The device can perform an interruption or shorting function as appropriate to interrupt power delivered to an arcing fault.

**Inverters, Converters and Charge Controllers with Integral Arc-fault
Circuit-Interrupter Protection**

Inverters, converters and charge controllers with integral PV dc arc-fault circuit-interrupter protection are additionally investigated to UL 1741, “Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources,” and are covered under Static Inverters, Converters and Accessories for Use in Independent Power Systems (QIKH).

PRODUCT MARKINGS

Products are marked “Type 1” or “Type 2” as appropriate. Products are additionally marked with the manufacturer’s name, trademark, or other suitable means of identification, a type or catalog designation, the electrical ratings in dc voltage and load capacity in dc amperes, and short-circuit rating.

AFcIs are marked with the appropriate product name as specified under **UL MARK** below, where visible after installation.

Inverters, converters and charge controllers with integral arc-fault circuit-interrupter protection are marked “Photovoltaic Arc-Fault Circuit-Protection” or equivalent, where visible after installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1699B, “Outline of Investigation for Photovoltaic (PV) DC Arc-Fault Circuit Protection.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Photovoltaic Arc-fault Circuit Interrupter” (or “Photovoltaic AFCI” or “PV AFCI”), “Photovoltaic Arc-fault Detector” (or “Photovoltaic AFD” or “PV AFD”) or “Photovoltaic Interrupting Device” (or “Photovoltaic ID” or “PV ID”).

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**PHOTOVOLTAIC MODULES AND PANELS
(QIGU)****USE AND INSTALLATION**

This category covers flat-plate photovoltaic modules and panels intended for mounting on buildings or on ground-supported frames. Roof-mounted modules or panels are investigated for one of three mounting methods: (1) integral to the roof of a building, (2) directly on a building’s roof, or (3) on a rack with a space above the roof surface.

When mounted integral to a building’s roof the module serves as the waterproof membrane. Direct-mounted panels are placed upon the building’s waterproof membrane (shingles or the like). Rack-mounted styles are spaced away from the building’s roof member. Rack-mounted styles may also be installed separate from buildings.

Installation of modules on or integral to a building’s roof system may or may not adversely affect the roof-covering materials’ resistance to external fire exposure if the module has a lesser or no fire-resistance rating. Roof-covering materials will not be adversely affected when the modules have an equal or greater fire-resistance rating than the roof-covering material.

Photovoltaic modules and panels are intended to be connected to electrical loads, controllers, or to static inverters that convert the dc power the modules or panels generate to other types of power compatible with the intended loads. This category does not include AC modules; see AC Modules (QHYZ) for additional details. In addition to their voltage, current and power ratings, modules and panels are marked to indicate terminal

Photovoltaic Modules and Panels (QIGU)—Continued

polarity, maximum series overcurrent device rating, and minimum acceptable diode bypassing (if needed). Installation of the modules and panels, including connection between the modules and the panels and the load, static inverters or controller is intended to be in accordance with ANSI/NFPA 70, "National Electrical Code."

Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes including the class of roof covering.

FLAME CLASSES

When applicable, modules and panels are marked "Class A," "Class B" or "Class C" to denote their resistance to external fire exposure. Modules and panels that have not been identified with respect to their resistance to external fire exposure are marked "Not Fire Rated." For significance of external fire exposure classes, see Roof-covering Materials (TEVT) and Roofing Systems (TGFU).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1703, "Flat-Plate Photovoltaic Modules and Panels."

ADJUNCT SERVICE

UL provides a service for the Classification of photovoltaic modules and panels that not only meet the appropriate requirements of UL but also have been investigated to one or more of the following design qualification standards:

- IEEE 1262, "IEEE Recommended Practice for Qualification of Photovoltaic (PV) Modules"
- IEC 61215, "Crystalline Silicon Terrestrial Photovoltaic Modules - Design Qualification and Type Approval"
- IEC 61646, "Thin-film Terrestrial Photovoltaic Modules - Design Qualification and Approval"
- IEC 61730, "Photovoltaic (PV) Module Safety Qualification"
- EN 61730, "Photovoltaic (PV) Module Safety Qualification"

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photovoltaic Module" or "Photovoltaic Panel."

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated to IEEE, IEC or EN design qualification standards. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following marking: "ALSO CLASSIFIED IN ACCORDANCE WITH *," where "*" is one or more of the following:

- IEEE 1262-(issue date)
- IEC 61215-(issue date)
- IEC 61646-(issue date)
- IEC 61730-(issue date)
- EN 61730-(issue date)

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PHOTOVOLTAIC MODULES AND PANELS, REMANUFACTURED (QIGZ)

USE AND INSTALLATION

This category covers remanufactured flat-plate photovoltaic modules and panels intended for mounting on buildings or on ground-supported frames. Remanufactured flat-plate photovoltaic modules and panels are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Remanufactured flat-plate photovoltaic modules and panels are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Remanufactured flat-plate photovoltaic modules and panels are subject to the same requirements as new remanufactured flat-plate photovoltaic modules and panels.

Roof-mounted modules and panels are investigated for one of three mounting methods: (1) integral to the roof of a building, (2) directly on a building's roof, or (3) on a rack with a space above the roof surface.

When mounted integral to a building's roof, the module serves as the waterproof membrane. Direct-mounted panels are placed upon the building's waterproof membrane (shingles or the like). Rack-mounted styles are spaced away from the building's roof member. Rack-mounted styles may also be installed separate from buildings.

Photovoltaic Modules and Panels, Remanufactured (QIGZ)—Continued

Installation of modules on or integral to a building's roof system may adversely affect the roof covering materials' resistance to external fire exposure if the module has a lesser or no fire-resistance rating. Roof-covering materials will not be adversely affected when the modules have an equal or greater fire-resistance rating than the roof-covering material.

Remanufactured photovoltaic modules and panels are intended to be connected to electrical loads, controllers, or to static inverters that convert the dc power the modules or panels generate to other types of power compatible with the intended loads. This category does not cover AC modules; see AC Modules (QHYZ) for additional details. In addition to their voltage, current and power ratings, modules and panels are marked to indicate terminal polarity, maximum series overcurrent device rating, and minimum acceptable diode bypassing (if needed). Installation of the modules and panels, including connection between the modules and the panels and the load, static inverters or controller is intended to be in accordance with ANSI/NFPA 70, "National Electrical Code." Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes including the class of roof covering.

FLAME CLASSES

When applicable, modules and panels are marked "Class A," "Class B" or "Class C" to denote their resistance to external fire exposure. Modules and panels that have not been identified with respect to their resistance to external fire exposure are marked "Not Fire Rated." For significance of external fire exposure classes, see Roofing Systems (TGFU).

RELATED PRODUCTS

Additional Listings of flat-plate photovoltaic modules and panels are covered under Photovoltaic Modules and Panels (QIGU).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1703, "Flat-Plate Photovoltaic Modules and Panels."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Remanufactured Photovoltaic Module" or "Remanufactured Photovoltaic Panel."

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PHOTOVOLTAIC MODULES AND PANELS WITH SYSTEM VOLTAGE RATINGS OVER 600 VOLTS (QIIA)

USE AND INSTALLATION

This category covers flat-plate photovoltaic modules and panels with system voltage ratings above 600 V up to and including 1000 V.

These modules and panels are intended for mounting on ground-supported frames, and may be mounted on a building roof when the maximum system voltage of the photovoltaic installation is limited to 600 V. Roof-mounted modules and panels are investigated for one of three mounting methods: (1) integral to the roof of a building, (2) directly on a building's roof, or (3) on a rack with a space above the roof surface.

When mounted integral to a building's roof, the module serves as the waterproof membrane. Direct-mounted panels are placed upon the building's waterproof membrane (shingles or the like). Rack-mounted styles are spaced away from the building's roof member. Rack-mounted styles may also be installed separate from buildings.

Installation of modules on or integral to a building's roof system may or may not adversely affect the roof-covering materials' resistance to external fire exposure if the module has a lesser or no fire-resistance rating. Roof-covering materials will not be adversely affected when the modules have an equal or greater fire-resistance rating than the roof-covering material.

Photovoltaic modules and panels are intended to be connected to electrical loads, controllers, or to static inverters that convert the dc power the modules or panels generate to other types of power compatible with the intended loads. In addition to their voltage, current and power ratings, modules and panels are marked to indicate terminal polarity, maximum series overcurrent device rating, and minimum acceptable diode bypassing (if needed). Installation of the modules and panels, including connection between the modules and the panels and the load, static inverters or controller is intended to be in accordance with ANSI/NFPA 70, "National Elec-

Photovoltaic Modules and Panels with System Voltage Ratings Over 600 Volts (QIIA)—Continued

trical Code” (NEC). Note that installation with a maximum photovoltaic system voltage over 600 V is intended to comply with Article 690, Part IX of the NEC.

Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes including the class of roof covering.

FLAME CLASSES

When applicable, modules and panels are marked “Class A,” “Class B” or “Class C” to denote their resistance to external fire exposure. Modules and panels that have not been identified with respect to their resistance to external fire exposure are marked “Not Fire Rated.” For significance of external fire exposure classes, see Roof-covering Materials (TEVT) and Roofing Systems (TGFU).

RELATED PRODUCTS

AC modules are covered under AC Modules (QHYZ).

Modules and panels with maximum system voltage ratings of 600 V or less are covered under Photovoltaic Modules and Panels (QIGU).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1703, “Flat-Plate Photovoltaic Modules and Panels.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Photovoltaic Module Over 600 Volts” or “Photovoltaic Panel Over 600 Volts.”

For products additionally investigated for resistance to external fire exposure, the Listing Mark includes the words **Class A**, **Class B** or **Class C**, as appropriate.

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DISTRIBUTED GENERATION POWER SYSTEMS ACCESSORY EQUIPMENT (QIIO)

GENERAL

This category covers actuators, blocking diodes, conduit boxes, photovoltaic combiner boxes, controllers (control boxes), communication modules, disconnects, distribution panels and transition boxes.

This accessory equipment is intended to be installed in accordance with ANSI/NFPA 70, “National Electrical Code,” including Articles 690 and 692.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1741, “Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Distributed Generation Utility Interconnection Controller,” “Photovoltaic System Ground Fault Detector Interrupter,” “Photovoltaic System Transition Box,” “Photovoltaic Disconnect,” “Photovoltaic System Control Box,” “Distributed Generation System Distribution Panel,” “Distributed Generation Interface Module,” “Distributed Generation Communications Module,” “Photovoltaic Combiner Box,” or other appropriate product name as shown in the individual Listings.

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DISTRIBUTED RESOURCE POWER SYSTEMS (QIJL)

GENERAL

This category covers permanently-connected distributed resource power systems, which may include combinations of components or products including, but not limited to, photovoltaic modules, fuel cells, synchronous generators, induction generators, batteries, energy-storage devices, inverters, converters, charge controllers, utility interconnection systems equipment and protection relays. This combination of equipment is intended to combine, convert, transform or relay energy from one or more ac or dc sources for use in stand-alone (not grid-connected to the Area EPS) and/or utility-interactive (grid-connected to the Area EPS) power systems to provide power to load/utilization equipment. Utility-interactive inverters and converters are intended to be installed in conjunction with an electric supply system Area EPS or an electric utility to supply energy to common loads.

Distributed resource power systems are factory- or field-wired assemblies in which the combination has been investigated for operation as a system assembly when installed in accordance with the manufacturer’s installation instructions.

These systems are intended to be installed in accordance with ANSI/NFPA 70, “National Electrical Code.”

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Photovoltaic modules and panels are investigated to ANSI/UL 1703, “Flat-Plate Photovoltaic Modules and Panels,” and are also covered under Photovoltaic Modules and Panels (QIGU).

Equipment intended to provide a primary, secondary, or primary and secondary power source to specified or nonspecified loads in parallel or separate from the utility is investigated to UL 1741, “Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources,” and is also covered under Static Inverters and Converters for Use in Independent Power Systems (QIKH). Examples of this equipment are utility interactive, stand-alone, multimode inverters or converters, interconnection system equipment and photovoltaic charge controllers.

Internal-combustion-engine-driven electrical generating (engine generator or microturbine) equipment that consumes fuels such as gasoline, natural gas, LP-gas, diesel etc., is investigated to ANSI/UL 2200, “Stationary Generator Engine Assemblies,” and is also covered under Engine Generators (FTSR).

These products may contain features or functions for combined heat and power production (CHP). CHP products that produce heat or perform a heat transfer function, in addition to electric power conversion, comply with the applicable requirements of ANSI/UL 1995, “Heating and Cooling Equipment,” ANSI/UL 834, “Heating, Water Supply, and Power Boilers – Electric,” UL 795, “Commercial-Industrial Gas Heating Equipment,” and/or UL Subject 1279, “Outline of Investigation for Solar Collectors.”

Batteries for energy-storage equipment are investigated to UL Subject 1973, “Outline of Investigation for Batteries for Use in Light Electric Rail (LER) Applications and Stationary Applications,” and are also covered under Batteries for Use in Light Electric Rail and Stationary Applications (BBFX).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Distributed Resource Power System” or “Photovoltaic Power System,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PHOTOVOLTAIC SOLAR TRACKERS (QIKA)

USE AND INSTALLATION

This category covers photovoltaic (PV) solar trackers intended for use with specific PV modules, panels, concentrated PV devices, and specified module frames and mounting structures as identified in the individual Listings. PV solar trackers are investigated for one of two installation types: (1) ground mounted, or (2) intended to serve as part of a nonstructural component of a building. Trackers intended to be installed in readily accessible locations have been investigated for all mechanical hazards as defined in UL Subject 3703, “Outline of Investigation for Solar Trackers.” Products intended for installation in locations not readily accessible have

PRODUCT CATEGORIES BY CATEGORY CODE

Photovoltaic Solar Trackers (QJKA)–Continued

been investigated with consideration given to the mechanical hazard requirements of UL Subject 3703. The solar tracker and its functions have been investigated with respect to risk of electric shock and fire hazards, as well as the mechanical loading (and electrical bonding) of the solar-tracker platform in accordance with UL Subject 2703, “Outline of Investigation for Rack Mounting Systems and Clamping Devices for Flat-Plate Photovoltaic Modules and Panels.”

The installation of these solar trackers is intended to be in accordance with ANSI/NFPA 70, “National Electrical Code,” in addition to any applicable building codes.

Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes, including the class of roof covering.

CLASSES

When applicable, modules or panels are identified as Class A, B or C to denote their resistance to external fire exposure. Modules or panels that have not been identified with respect to their resistance to external fire exposure are marked “Not Fire Rated.” For significance of external fire exposure classes, see Roof-covering Materials (TEVT) and Roofing Systems (TGFU).

RELATED PRODUCTS

PV modules and panels are covered under Photovoltaic Modules and Panels (QIGU).

Photovoltaic concentrators are covered under Concentrator Photovoltaic Modules and Assemblies (QICP).

AC modules are covered under AC Modules (QHYZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 3703, “Outline of Investigation for Solar Trackers.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Photovoltaic Solar Tracker” (or “PV Solar Tracker”).

For products additionally investigated for resistance to external fire exposure, the Listing Mark includes the words CLASS A, CLASS B or CLASS C, as appropriate.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

STATIC INVERTERS, CONVERTERS AND ACCESSORIES FOR USE IN INDEPENDENT POWER SYSTEMS (QIKH)

USE AND INSTALLATION

This category covers permanently-connected inverters and converters for use in electric power systems. Inverters are devices that change DC power to AC power. Converters are devices that accept AC or DC power input and convert it to another form of AC or DC power for direct utilization by a load or accumulation in an energy storage system (batteries, capacitors, etc.). Electric power systems are defined as facilities that deliver electric power to a load. Devices covered under this category are classed as Utility Interactive, Stand-alone or Multimode. Utility Interactive devices operate in parallel with the utility grid. Stand-alone devices are intended to operate independent of the utility grid. Multimode devices can operate as both or either Stand-alone (utility independent) or Utility Interactive devices. Optional accessories intended for use with these units are also covered under this category.

These products may contain energy storage devices and associated charge controllers.

These devices are intended for installation in accordance with ANSI/NFPA 70, “National Electrical Code.”

The devices may be connected to different types and combinations of distributed generation (DG) sources: generator sets, photovoltaic cells, fuel cells, wind and microturbines or other sources as specified in the manufacturer’s installation instructions.

Some devices in this category are intended to be installed and operated with an external transformer. Such devices are provided with markings and instructions to indicate the type of transformer required.

These products may require external output overcurrent protection, which is specified in product markings and installation instructions. The products

Static Inverters, Converters and Accessories for Use in Independent Power Systems (QIKH)–Continued

require external overcurrent protection to be sized at 125% of the product output current rating unless otherwise specified.

These products may require that overcurrent protection be provided in the source circuits. These protection ratings are specified in the product installation instructions.

Devices containing charge controllers are provided with instructions to indicate the type of battery for which they are intended.

Units suitable for use with Listed field-installed accessories are marked to identify the specific accessories that may be used.

For units that are shipped in multiple sections where the end product requires that all of the sections be included and assembled to make a complete Listed product, the sections include the same end-product Listing Mark and are differentiated by section number as specified under UL MARK below.

For units that are shipped in multiple sections consisting of a complete end product and associated optional accessories investigated for use with the complete Listed end product, the complete end product has a single Listing Mark and the accessory(ies) are labeled as specified under UL MARK below with one of the applicable accessory markings.

SURGE TESTING

These products are investigated to surge categories for the Ring Wave and Combination Wave Surge Tests in IEEE C62.41.2-2002, “Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.” These particular surge waveforms that are applied to the DG equipment are based upon distance between the DG equipment and the service-entrance equipment. These location categories have associated peak values of voltage and current for the standard surge-testing waveforms as noted below. A manufacturer may also choose to test at a custom value for the Ring Wave and Combination Wave. These values are stated in the individual Listings for the product tested.

Surge Category	STANDARD WAVEFORM PEAK VALUES	
	Ring Wave	Combination Wave
A	6 kV/0.20 kA	N/A
B	6 kV/0.50 kA	6 kV/3 kA
C	N/A	20 kV/10 kA

The standard surge-testing waveforms are as follows:

- “Standard 1.2/50 μs – 8/20 us Combination Wave”
- “Standard 0.5 μs – 100 kHz Ring Wave”

Refer to IEEE C62.41.2-2002 for additional details on standard wave parameters and tolerances.

CODES

The following summarizes and defines the codes shown in the individual Listings.

Source Type	ST
Fuel Cell	FC
Photovoltaic	PV
Microturbine	MT
Wind Turbine	WT
Hydro Turbine	HT
Battery	B
Gen Set	GS
Other	O
Output Type	OT
Utility Interactive	UI
Stand-alone	SA
Multimode Open Transition	MMOT
Multimode Closed Transition	MMCT
Charger	C
Utility Testing	UT
Has been investigated for anti-islanding	AI
Has been investigated for over/undervoltage and frequency fluctuations with fixed trip limits	FTL
Has been investigated for over/undervoltage and frequency fluctuations with adjustable trip limits	ATL

DISTRIBUTED GENERATION POWER SYSTEMS EQUIPMENT (QHWJ)

Static Inverters, Converters and Accessories for Use in Independent Power Systems (QIKH)—Continued

Utility Testing	UT
Has not been investigated for anti-islanding and may need external protection	NAI
Has not been investigated for over/undervoltage and frequency fluctuations and may need external protection	NTL
Has been investigated for reverse current protection at the point of common coupling (PCC)	RCP
Isolation	Isol
Internal Transformer	IT
Transformerless	TL
External Transformer Specific*	ETS
External Transformer Generic*	ETG
* See manufacturer's specifications for external transformer ratings, construction and configuration	
Input/Output Power Configuration	POC
Single-phase 2-wire	S2
Single-phase 3-wire	S3
Three-phase 3-wire	T3
Three-phase 4-wire	T4
Maximum Overcurrent Protection	MOCP
Current rating in amps (example: 20 A)	20
Not applicable for Stand-alone units	NA
Enclosure Environmental Rating	ER
12	12
3	3
4	4
etc.	
Maximum Ambient of Continuous Operation at Full Rated Power	MA
Ambient rating in degrees Celsius (example: 40C)	40
Maximum Ambient of Operation	MA
Ambient rating in degrees Celsius (example: 60C)	60

FIRMWARE VERSION AND CHECKSUM

Version Number — Identification number of the software elements that specifies the investigated software version and current release.

Checksum or Unique Identifier — A unique identifier stored in non-volatile memory computed as a function of the critical and supervisory sections of the software.

RELATED PRODUCTS

Power converters and inverters intended for use in recreational or land vehicles and the like are covered under Power Converters/Inverters and Power Converter/Inverter Systems (QPPY).

Power converters and inverters intended for use in marine craft are covered under Power Converters/Inverters and Power Converter/Inverter Systems, Marine (QPQL).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1741, "Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources." UL 1741 provides a direct reference to IEEE 1547, "IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems," and IEEE 1547.1, "IEEE Standard Conformance Test Procedures for Equipment Interconnecting

DISTRIBUTED GENERATION POWER SYSTEMS EQUIPMENT (QHWJ)

Static Inverters, Converters and Accessories for Use in Independent Power Systems (QIKH)—Continued

Distributed Resources with Electric Power Systems," for the investigation of utility interconnection protection features and functions.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product designation. The product designation is the combination of the specific DG source and the type of inverter or converter product. Acceptable product designations include:

- "Fuel Cell Multimode Inverter"
 - "Fuel Cell Stand-alone Inverter"
 - "Fuel Cell Utility Interactive Inverter"
 - "Microturbine Multimode Inverter"
 - "Microturbine Stand-alone Inverter"
 - "Microturbine Utility Interactive Inverter"
 - "Photovoltaic Multimode Inverter"
 - "Photovoltaic Stand-alone Inverter"
 - "Photovoltaic Utility Interactive Inverter"
 - "Wind Turbine Multimode Inverter"
 - "Wind Turbine Stand-alone Inverter"
 - "Wind Turbine Utility Interactive Inverter"
- (or equivalent)

The product designation for accessories is one of the product designations noted above, preceded by the words "Accessory for."

For multi-piece units, the Listing Mark appears on each outside enclosure section constituting a complete inverter assembly eligible for Listing. The Listing Mark covers only the enclosure section to which it is affixed; it does not cover other enclosure sections included in the assembly. Each enclosure section of a Listed inverter assembly is provided with a "Section ___ of ___" marking, where the second blank indicates the total number of enclosure sections contained in the Listed inverter assembly and the first blank indicates the respective enclosure section number bearing the UL Mark.

If the source type does not appear in the product designation it must be indicated on the product as a separate marking.

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MOUNTING SYSTEMS, MOUNTING DEVICES, CLAMPING DEVICES AND GROUND LUGS FOR USE WITH PHOTOVOLTAIC MODULES AND PANELS (QIMS)

USE AND INSTALLATION

This category covers photovoltaic (PV) mounting systems, mounting devices, clamping devices (which may be for bonding and/or mechanical loading) and ground lugs intended for use with specific PV modules and panels and specified module frames and mounting structures as identified in the individual certifications. These systems and devices are investigated for one of two installation types: (1) ground mounted, or (2) intended to serve as part of a nonstructural component of a building, such as a stand-alone system on a building, curtain wall, facade, atrium, skylight, etc., which is applied extant to the primary building structure. Both mounting systems and clamping devices may be investigated for mechanical mounting alone, or mechanical mounting and ground bonding as identified in the individual certifications. Ground lugs may be investigated for use with specific PV modules, specific PV module frames, or specific mounting-system rails.

The installation of these mounting systems, clamping devices or bonding devices is intended to be in accordance with ANSI/NFPA 70, "National Electrical Code," in addition to any applicable building codes.

Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes, including the class of roof covering.

FLAME CLASSES

When applicable, modules and panels are marked "Class A," "Class B" or "Class C" to denote their resistance to external fire exposure. Modules and panels that have not been identified with respect to their resistance to external fire exposure are marked "Not Fire Rated." For significance of external fire exposure classes, see Roof-covering Materials (TEVT) and Roofing Systems (TGFU).

RELATED PRODUCTS

DISTRIBUTED GENERATION POWER SYSTEMS EQUIPMENT (QHWJ)

Mounting Systems, Mounting Devices, Clamping Devices and Ground Lugs for Use with Photovoltaic Modules and Panels (QIMS)—Continued

PV modules and panels are covered under Photovoltaic Modules and Panels (QIGU).

Low-concentration flat-plate modules are covered under Flat-plate, Low-concentration Photovoltaic Modules and Panels (QHZU).

PV concentrators are covered under Concentrator Photovoltaic Modules and Assemblies (QICP).

AC modules are covered under AC Modules (QHYZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2703, "Outline of Investigation for Rack Mounting Systems and Clamping Devices for Flat-Plate Photovoltaic Modules and Panels."

Ground lugs are additionally investigated to ANSI/UL 467, "Grounding and Bonding Equipment."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Photovoltaic Mounting System," "Photovoltaic Module Clamping Device," "Photovoltaic Mounting Device," "Photovoltaic Bonding Device," "Photovoltaic Mounting and Bonding Device" or "Photovoltaic Ground Lug." The word "Photovoltaic" may be abbreviated "PV."

For products additionally investigated for resistance to external fire exposure, the Listing Mark includes the words **CLASS A**, **CLASS B** or **CLASS C**, as appropriate.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PHOTOVOLTAIC LANTERNS, PORTABLE SOLAR, CERTIFIED FOR THE PV GAP MARK (QIMV)

GENERAL

This category covers portable solar photovoltaic (PV) lanterns, which are lighting systems that most often include the following components: lamps (fluorescent, LED, etc.), energy storage device (batteries, capacitors, etc.), switch, charger controllers, and PV cells or modules. With the exception of the PV module that may be integrated or separated, each system is placed in a suitable housing.

These PV lanterns are certified for the PV Global Approval Mark (GAP) as an extension of the CB Full Certification Scheme (CB-FCS) based on authorization from the International Electrotechnical Commission's System for Conformity Testing and Certification of Electrical Equipment and Components (IECEE). IECEE is the administrator of the PV Global Approval Program (PV GAP). This certification is in accordance with PVR 11A, "Portable Solar Photovoltaic (PV) Lanterns – Design Qualification and Type Approval." In addition to the CB Certification under the CB-FCS program, ISO 9000 registration and an ongoing product follow-up surveillance program are required. UL is a member of the IECEE, and is a National Certification Body (NCB). PVR 11A is in the Scope of UL's participation in the CB-FCS. IECEE has authorized UL to offer the PV GAP Quality Mark as described below on the basis of and as an extension to UL's CB-FCS program. The number "62" has been assigned to UL as a unique code to be applied to the certified product adjacent to the PV GAP Quality Mark and the PV GAP Seal in order to distinguish between the PV GAP Marks issued by UL and those granted by other NCBs.

This certification is not considered a safety certification. This certification is for design qualification and type approval of portable solar PV lanterns in accordance with PVR 11A.


REQUIREMENTS


The basic standard used to investigate products in this category is PVR 11A, "Portable Solar Photovoltaic (PV) Lanterns – Design Qualification and Type Approval."

PV GAP QUALITY MARK AND SEAL

The PV GAP Quality Mark and Seal issued by UL consists of the following images and the accompanying numeric code "62."

PHOTOVOLTAIC LANTERNS, PORTABLE SOLAR, CERTIFIED FOR THE PV GAP MARK (QIMV)

The PV GAP Quality Mark is applied to each component of the portable solar PV lantern system: 

The PV GAP Seal is applied to the portable solar PV lantern system as a whole: 

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PHOTOVOLTAIC MODULES AND PANELS CERTIFIED FOR THE PV GAP MARK (QIMY)

GENERAL

This category covers flat-plate photovoltaic (PV) modules and panels intended for mounting on buildings or on ground-supported frames.

These PV modules and panels are certified for the PV Global Approval Mark (GAP) as an extension of the CB Full Certification Scheme (CB-FCS) based on authorization from the International Electrotechnical Commission's System for Conformity Testing and Certification of Electrical Equipment and Components (IECEE). IECEE is the administrator of the PV Global Approval Program (PV GAP). This certification is in accordance with IEC 61215, "Crystalline Silicon Terrestrial Photovoltaic Modules – Design Qualification and Type Approval," and IEC 61646, "Thin-Film Terrestrial Photovoltaic Modules – Design Qualification and Type Approval." In addition to the CB Certification under the CB-FCS program, ISO 9000 registration and an ongoing product follow-up surveillance program are required. UL is a member of the IECEE, and is a National Certification Body (NCB). IEC 61215 and IEC 61646 are in the Scope of UL's participation in the CB-FCS. IECEE has authorized UL to offer the PV GAP Quality Mark as described below on the basis of and as an extension to UL's CB-FCS program. The number "62" has been assigned to UL as a unique code to be applied to the certified product adjacent to the PV GAP Quality Mark in order to distinguish between the PV GAP Marks issued by UL and those granted by other NCBs.


These products may also bear UL's Listing Mark for PV modules and panels; see Photovoltaic Modules and Panels (QIGU).

Although this certification may be issued in conjunction with a safety certification, this certification is not considered a safety certification. This certification is for design qualification and type approval of PV modules and panels in accordance with IEC 61215 and IEC 61646.

REQUIREMENTS

The basic standards used to investigate products in this category are IEC 61215, "Crystalline Silicon Terrestrial Photovoltaic Modules – Design Qualification and Type Approval," and IEC 61646, "Thin-Film Terrestrial Photovoltaic Modules – Design Qualification and Type Approval."

PV GAP QUALITY MARK

The PV GAP Quality Mark issued by UL consists of the following image and the accompanying numeric code "62," and is applied to each PV module and panel: 

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PHOTOGRAPHIC EQUIPMENT (QINT)

GENERAL

This category covers the following photographic equipment and accessories:

Motion picture projectors for use with 8 mm, 16 mm, 35 mm and larger motion picture film, including associated equipment suitable for use in projection booths. Users should consult with Authorities Having Jurisdiction for requirements on installation and use. 8 mm and 16 mm projectors are commonly of the portable type intended for nonprofessional use with slow-burning film only. Projectors for use with 35 mm or larger film are intended for professional use and may employ flammable (nitro-cellulose) or slow-burning (cellulose acetate or equivalent) films. Projectors for use with flammable films should be installed and used only in fire resistance booths as recommended by ANSI/NFPA 40, "Storage and Handling of Cellulose Nitrate Film." These projectors can be divided into two general classes of construction: (1) Complete assemblies, usually of the portable type, having all parts needed for projection of motion picture film, with or without facili-

PHOTOGRAPHIC EQUIPMENT (QINT)

ties for reproduction of sound recorded on films; and (2) Pedestal types which are intended for use with other certified components to form a complete machine, usually composed of a base, projection head and magazines with fire rollers.

Still-picture projectors for use with slides, pictures, drawings or similar stationary graphic material of a slow-burning classification, including opaque and overhead projectors and combination slide projectors or film strip projectors with phonograph or audio tape players.

Accessories intended for installation on projectors or employed in conjunction with viewing, editing or handling of films used with picture projectors.

Equipment intended for use in taking photographs, processing and handling of photographic film or photographic prints and accessory equipment including film dryers, cutters, sorters, rewinders and silver-recovery units.

Equipment intended to take photographs from video display units.

REBUILT PRODUCTS

This category also covers photographic equipment that is rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt photographic equipment is rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt photographic equipment is subject to the same requirements as new photographic equipment.

RELATED PRODUCTS

For portable toy machines for use with slow-burning films, see Toys (XNIZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 122, "Photographic Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photographic Equipment" or other appropriate product name as shown in the individual Listings.

For rebuilt products, the word "Rebuilt," "Refurbished" or "Remanufactured" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PIN-AND-SLEEVE-TYPE PLUGS, RECEPTACLES AND CABLE CONNECTORS (QLGD)

RATINGS

Pin-and-sleeve-type plugs, receptacles and cable connectors are rated in 600 V or less, ac or dc, and in amps. Devices intended for use with motor loads are identified by a horsepower rating. Devices not intended for current interruption are marked "Do Not Disconnect Under Load," or with an equivalent statement.

Devices rated 250 V are tested on circuits involving a nominal potential to ground of 125 V. Devices having other voltage ratings are tested on circuits involving full-rated potential to ground, except for multiphase-rated devices, which are tested on circuits consistent with their voltage ratings, i.e., a 120/208 V, 3-phase device is tested on a circuit involving a potential to ground of 120 V.

Devices identified as "switch-rated plugs and receptacles suitable as motor circuit disconnect switches" incorporate a "switch" mechanism that has been additionally investigated for making and breaking a motor load. They have provision to open the electrical circuit without uncoupling the mated plug-and-receptacle housings (device enclosures). Such devices are investigated at six times the full load motor continuous current at rated voltage and are also identified by a horsepower rating. These devices have also been investigated for a minimum 10,000 A short-circuit make and withstand rating.

Devices identified as "switch-rated plugs and receptacles suitable as branch circuit disconnect switches" incorporate an integrally formed "switch" suitable for use in branch circuit switching applications. They have provision to open the electrical circuit without uncoupling the mated plug and receptacle housings. These devices have also been investigated for a minimum 10,000 A short-circuit make and withstand rating.

PIN-AND-SLEEVE-TYPE PLUGS, RECEPTACLES AND CABLE CONNECTORS (QLGD)

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GROUNDING

Devices having a terminal identified by a green-colored finish or by the word "green" are grounding types. The pin or contact member connected to this terminal is for equipment grounding only.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ATTACHMENT PLUGS, PIN-AND-SLEEVE TYPE (QLHN)

GENERAL

This category covers pin-and-sleeve-type attachment-plug bodies, attachment plugs with and without fuses, cord connectors and adapters. These devices are intended for use with the same line of products covered under Receptacles, Pin-and-Sleeve Type (QLIW). Devices for use in specific combinations with other manufacturers' products are covered under Receptacle-Plug Combinations, Pin-and-Sleeve Type, Classified for Use in Specific Combinations (QLKH).

The termination provisions of these devices are based on the use of flexible cord or cable having copper conductors, in accordance with Article 400 of ANSI/NFPA 70, "National Electrical Code" (NEC). The ampacity of the flexible cord and cable is based on Section 400.5 and Tables 400.5(A) and 400.5(B) of the NEC. The conductors are sized as specified on the product or in the manufacturer's instructions provided with the device. Unless the product is marked with both the size and temperature rating of the flexible cord or cable to be used, the termination provisions are based on the use of 60°C flexible cord or cable.

This category does not cover devices to be molded on flexible cord or cable and unassembled devices to be factory assembled to flexible cord or cable.

ADDITIONAL INFORMATION

For additional information, see Pin-and-Sleeve-type Plugs, Receptacles and Cable Connectors (QLGD) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1682, "Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type."

Devices identified as switch-rated plugs/receptacles are additionally investigated to UL Subject 2682, "Outline of Investigation for Switch-Rated Plugs and Receptacles."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Pin-and-Sleeve Attachment Plug," "Plug" or "Connector," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RECEPTACLES, PIN-AND-SLEEVE TYPE (QLIW)

GENERAL

This category covers pin-and-sleeve-type receptacles and other outlet devices intended for direct connection to wiring systems recognized by ANSI/NFPA 70, "National Electrical Code" (NEC). It also covers other pin-and-sleeve-type receptacles, outlet devices and power inlets intended for use in appliances and other equipment.

These devices are intended for use with the same line of products covered under Attachment Plugs, Pin-and-Sleeve Type (QLHN). Devices for use in specific combinations with other manufacturers' products are covered under Receptacle-Plug Combinations, Pin-and-Sleeve Type, Classified for Use in Specific Combinations (QLKH).

The terminations of these devices are intended for use with copper conductors and are marked to indicate the conductor size and temperature rating of all field-installed conductors. Such markings are located where readily visible on the device or in a wiring diagram provided with the device. If no marking is provided, the termination provisions are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in circuits rated more than 100 A as specified in Table 310.16 of the NEC.

Receptacles, Pin-and-Sleeve Type (QLIW)–Continued

Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (devices rated 100 A or less) or 75°C ampacity (devices rated over 100 A).

ADDITIONAL INFORMATION

For additional information, see Pin-and-Sleeve-type Plugs, Receptacles and Cable Connectors (QLGD) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1682, “Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type.”

Devices identified as switch-rated plugs/receptacles are additionally investigated to UL Subject 2682, “Outline of Investigation for Switch-Rated Plugs and Receptacles.”

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Pin-and-Sleeve Receptacle,” “Receptacle,” “Switch Receptacle,” “Power Inlet,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RECEPTACLE-PLUG COMBINATIONS, PIN-AND-SLEEVE TYPE, CLASSIFIED FOR USE IN SPECIFIC COMBINATIONS (QLKH)

USE

This category covers combinations of pin-and-sleeve-type plugs, receptacles, power inlets and connectors that have been investigated for use in specific combinations as indicated in the individual Classifications.

These combination devices have been investigated for use with other manufacturers’ Listed plugs, receptacles, connectors or power inlets. Basic Listings are covered under Attachment Plugs, Pin-and-Sleeve Type (QLHN) and Receptacles, Pin-and-Sleeve Type (QLIW), with additional Listings under Attachment Plugs, Fuseless (AXUT) and Receptacles for Plugs and Attachment Plugs (RTRT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1682, “Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type.”

Devices identified as switch-rated plugs/receptacles are additionally investigated to UL Subject 2682, “Outline of Investigation for Switch-Rated Plugs and Receptacles.”

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the appropriate Listing Mark, the statement “Also Classified by Underwriters Laboratories Inc. for use in specific combinations,” and one of the following statements as appropriate: “For use with UL Listed *, Catalog No. ____,” or “For catalog numbers of compatible devices, refer to Publication No. ____ provided with this device. If additional information is necessary contact the factory.”

* “Receptacle,” “Plug” or “Connector”

The referenced publication is a compatibility list, which tabulates the company name, catalog number and electrical ratings of the Classified device and the company name and catalog number of the applicable UL Listed product with which it has been investigated. One copy of the compatibility list is provided with each device.

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expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PLASTICS USED IN SEMICONDUCTOR TOOL CONSTRUCTION (QMTW)

GENERAL

This category covers plastic materials used in the semiconductor tool construction industry. Plastic in the form of sheets, panels and strips has been investigated with respect to flammability characteristics only. The structural, washability, light reflectivity, durability, toxicity or environmental impact of the products of combustion and other properties have not been investigated. In addition, the suitability of the materials to be fabricated has not been investigated.

The following flammability and physical properties are investigated and published in the individual certifications:

- Flame Propagation Index (FPI)
- Smoke Damage Index (SDI)
- Nominal Thickness (in.)
- Product Geometry
- Manufacturing Method

In addition to the above, the following data is available based on authorization of the test sponsor:

- Parallel Panel Test, Maximum Vertical Flame Propagation (ft.) (if required)
- Maximum Heat Release Rate (kW/m²)
- Maximum Smoke Release Rate (m²/sec)
- Critical Ignition Flux (kW/m²)
- Time Dependent Plot of Heat Release Rate
- Time Dependent Plot of Mass Loss Rate
- Time Dependent Plot of Smoke Obscuration
- Time Dependent Plot of CO Concentration
- Time to Ignition (sec)
- Flame Duration (sec)
- Total Smoke (m²)
- Mass Loss (%)
- Average Effective Heat of Combustion
- Average Specific Extinction Area

The materials are identified as “Nonpropagating – Class 1,” “Limited Propagating – Class 2” or “Slow Propagating – Class 3.” The individual certifications are defined as follows:

Test	Description	Nonpropagating, Class 1	Limited Propagating, Class 2	Slow Propagating, Class 3
Parallel Panel Test	Flame propagation	4 ft or less	8 ft or less	8 ft or less at 10 min
	Pooling of melted material	No	No	No
Heat and smoke release ^a	Fire propagation index (FPI)	6 or less	Parallel panel required	Parallel panel required
	Smoke damage index (SDI)	0.4 or less	0.4 or less	less than 1

^aASTM E1354 (1997), “Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter” (American Society for Testing and Materials, Philadelphia, PA)

ADDITIONAL INFORMATION

For additional information, see Fire-resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2360, “Test Methods for Determining the Combustibility Characteristics of Plastics Used in Semiconductor Tool Construction.” The combustibility characteristics provide data with regard to the Flame Propagation Index (FPI) and the Smoke Damage Index (SDI).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

PLASTICS USED IN SEMICONDUCTOR TOOL CONSTRUCTION (QMTW)

PLASTIC FOR USE IN SEMICONDUCTOR TOOL CONSTRUCTION

Control No.

* the "propagating" statement "(Non-Propagating - Class 1," "Limited Propagating - Class 2," or "Slow Propagating - Class 3") applicable to the product

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PLUMBING ACCESSORIES (QMTX)

GENERAL

This category covers plumbing accessories connected to or used with plumbing in commercial locations or residential occupancies, including irrigation equipment, sprinkler controls, water controls located in kitchens and bathrooms, electric faucets, toilet-flushing systems, lawn sprinklers, plumbing controls, hydromassage chairs and pedicure spas.

This category also covers toilets, bidets, and combination toilet/bidets. Products suitable for outdoor use and those for use with heated liquids are so marked.

These products have not been investigated with respect to the effect of their use with corrosive liquids or aqueous solutions containing corrosive materials.

REBUILT PRODUCTS

This category also covers plumbing accessories that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt plumbing accessories are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt plumbing accessories are subject to the same requirements as new plumbing accessories.

RELATED PRODUCTS

Similar equipment for use with or in proximity to swimming pools or spas is covered under Swimming Pool and Spa Equipment (WABX).

Products and materials investigated for contact with drinking water are Classified to ANSI/NSF 61 and are covered under Drinking Water System Components (FDNP).

Plumbing fixture fittings investigated to ASME A112.18.1, ASSE 1014 and ASSE 1025 are covered under Plumbing Fixture Fittings (QNSQ).

Pumps are covered under Pumps, Electrically Operated, Liquid (REUZ). See also Pumping Equipment for Fire Service (QVUT).

Toilet seat assemblies (including bidet seats) containing electrical features, such as heating and water-dispensing components, that connect to separate plumbing features are covered under Personal Hygiene and Health Care Appliances (QGRZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1951, "Electric Plumbing Accessories."

ADJUNCT SERVICE

UL also provides a service for the Classification of plumbing accessories that not only meet the appropriate requirements of UL but have also been investigated in accordance with the following standards:

1. ANSI/ASME A112.19.7M, "Requirements for Whirlpool Bathtub Appliances."
2. Water retention test requirement from ANSI/ASME A112.19.7M.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Faucet" or "Lawn Sprinkler Control," or other appropriate product name as shown in the individual Listings.

For rebuilt products the word "Rebuilt" precedes the product name.

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with standards or parts detailed below from standards of the American National Standards Institute (ANSI). The combined Listing/Classification Mark consists of the Listing Mark elements detailed above along with the following:

"ALSO CLASSIFIED IN ACCORDANCE WITH *," where "*" is one of the texts detailed below.

1. ANSI/ASME A112.19.7M-+
2. WATER RETENTION TEST REQUIREMENT FROM ANSI/ASME A112.19.7M-+

PLUMBING ACCESSORIES (QMTX)

+ Issue date of standard or latest addendum

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PLUMBING ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (QNHV)

GENERAL

This category covers pump assemblies and controls for use in pumping sewage. Assemblies exposed to sewage have constructions intended to reduce corrosion of enclosure parts and explosion-proof joints. They have not been investigated for use where severe corrosive conditions are likely to be present.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations."

UL MARK

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Control Unit for Use in Hazardous Locations" or "Submersible Sump Pump for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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PORTABLE ELECTRIC HAND LAMPS (QORX)

GENERAL

This category covers portable electric hand lamps of the incandescent, LED and fluorescent types, rated 125 V, 300 W or less. These products have a length of flexible cord and an attachment plug for connection to a source of supply, an insulating handle, a lamp guard if applicable, and provisions for temporary support. These products are not intended for outdoor use unless marked "Suitable for Wet Locations," or for use in hazardous (classified) locations or above hazardous locations as defined in ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 153, "Portable Luminaires."

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Hand Lamp."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PORTABLE LIGHTING PRODUCTS (QOTU)

GENERAL

This category covers lampshades, nightlights, light-emitting-diode (LED) nightlights, office furnishing lights, portable cabinet luminaires, portable cabinet LED luminaires, portable luminaire kits and subassemblies, portable luminaires, portable LED luminaires, portable work lights, and sun and heat lamps.

RELATED PRODUCTS

Portable lighting products and associated furnishings investigated for use together are covered under Furnishings, Household and Commercial (IYQX).

Portable lighting products used as hand lamps are covered under Portable Electric Hand Lamps (QORX) or Portable Hand Lamp Accessories (QOSV).

Portable lighting products intended for seasonal use are covered under Christmas Tree and Decorative Outfit Accessories (DGWU), Outfits, Decorative (DGXW) or Strings, Decorative Lighting (DGZZ).

Portable lighting products intended for use in hazardous (classified) locations are covered under Portable Lighting Units for Use in Hazardous Locations (QPKX).

Portable lighting products intended for temporary use (such as at construction sites or car sales lots) are covered under Temporary-lighting Strings (XBRT).

Portable lighting products intended for theatrical use are covered under Stage and Studio Luminaires, Accessories and Connector Strips (IFDZ).

PORTABLE CABINET LIGHT-EMITTING-DIODE LUMINAIRES (QOVA)

USE AND INSTALLATION

This category covers surface- and recess-mounted portable cabinet light-emitting-diode (LED) luminaires intended for installation into open or enclosed portable cabinets, such as china hutches, bookcases, bars, consoles, bed headboards, and similar locations.

This category also covers low-voltage LED lighting systems intended for installation under a shelf, cabinet or similar structural surface, in accordance with Article 411 of ANSI/NFPA 70, "National Electrical Code" (NEC), where the power supply is of the attachment plug equipped, cord-connected type, or is a direct-plug-in type.

This category also covers portable cabinet LED luminaire accessories, such as interconnecting cord sets and dimmer and switch assemblies, intended for use with portable cabinet LED luminaires.

A surface-mounted portable cabinet LED luminaire is also suitable for installation under a shelf or kitchen cabinet when the line voltage power-supply cord is not concealed.

These products are not intended for installation in recessed walls or ceilings, or in permanently installed cabinets where the wiring is concealed or passed through openings in the structure.

A portable cabinet LED luminaire connected to a Class 2 power supply that is suitable for installation inside a kitchen cabinet or other built-in furnishing is provided with instructions that advise:

1. the Class 2 power supply shall be located outside the cabinet and not concealed, and
2. the line voltage power-supply cord shall not be concealed or run through openings in the cabinets, walls, ceilings or floors.

Portable cabinet LED luminaires have been investigated for mounting in accordance with the clearances marked on the product. Portable cabinet luminaires not marked with clearances may be mounted as close to any surface as permitted by the housing, an integral mounting flange, bracket or spacer.

A restrictive marking is provided for portable cabinet luminaires intended for use only in open-top cabinets. Portable cabinet luminaires without the restrictive marking are investigated for a 1/2 in. (13 mm) minimum clearance from the top.

RELATED PRODUCTS

LED luminaires intended for installation in permanently installed cabinets, where the wiring is concealed or passed through openings in the structure, are covered under Light-emitting-diode Surface-mounted Luminaires (IFAM) for surface mounting, or Light-emitting-diode Recessed Luminaires (IFAQ) for recessed mounting.

Low-voltage LED lighting systems intended for installation in accordance with Article 411 of the NEC in permanently installed cabinets, having a remote power source connected to a fixed wiring means, are covered under Low-voltage Lighting Systems, Power Units, Luminaires and Fittings (IFDR).

Portable cabinet LED luminaires investigated for use with specific cabinet or display designs are certified together with the cabinet or display as Furnishings, Household and Commercial (IYQX).

ADDITIONAL INFORMATION

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Portable Cabinet Light-emitting-diode Luminaires (QOVA)—Continued

The basic standards used to investigate products in this category are ANSI/UL 153, "Portable Electric Luminaires," and ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Cabinet Light-emitting-diode Luminaire" (or "Portable Cabinet LED Luminaire") or "Portable Cabinet Light-emitting-diode Luminaire Accessory" (or "Portable Cabinet LED Luminaire Accessory").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PORTABLE CABINET LUMINAIRES (QOVJ)

USE AND INSTALLATION

This category covers surface and recess-mounted portable cabinet luminaires intended for installation into open or enclosed portable cabinets such as china hutches, bookcases, bars, consoles, bed headboards, and similar locations.

This category also covers low-voltage lighting systems intended for installation under a shelf, cabinet, or similar structural surface, in accordance with Article 411 of ANSI/NFPA 70, "National Electrical Code" (NEC), where the power supply is of the attachment plug equipped, cord-connected type, or is a direct plug-in type.

This category also covers portable cabinet luminaire accessories, such as interconnecting cord sets and dimmer and switch assemblies intended for use with portable cabinet luminaires.

A surface-mounted portable cabinet luminaire is also suitable for installation under a shelf or kitchen cabinet when the line voltage power-supply cord is not concealed.

These products are not intended for installation in recessed walls or ceilings, or in permanently installed cabinets where the wiring is concealed or passed through openings in the structure.

A portable cabinet luminaire connected to a Class 2 power supply that is suitable for installation inside a kitchen cabinet or other built-in furnishing is provided with instructions that advise:

1. the Class 2 power supply shall be located outside the cabinet and not concealed, and
2. the line voltage power-supply cord shall not be concealed or run through openings in the cabinets, walls, ceilings or floors.

Portable cabinet luminaires have been investigated for mounting in accordance with the clearances marked on the product. Portable cabinet luminaires not marked with clearances may be mounted as close to any surface as permitted by the housing, an integral mounting flange, bracket or spacer.

A restrictive marking is provided for portable cabinet luminaires intended for use only in open top cabinets. Portable cabinet luminaires without the restrictive marking are investigated for a 13 mm (1/2 in.) minimum clearance from the top.

The individual certifications may include one or more Roman numerals (from II through XIV) that had previously been used to identify certain types of portable luminaires covered under that certification. This identification system is no longer in use, and these Roman numerals can be disregarded.

RELATED PRODUCTS

Incandescent or fluorescent luminaires intended for installation in permanently installed cabinets, where the wiring is concealed or passed through openings in the structure, are covered under Incandescent Surface-mounted Luminaires (IEZR) or Fluorescent Surface-mounted Luminaires (IEUZ) for surface mounting, or Incandescent Recessed Luminaires (IEZX) or Fluorescent Recessed Luminaires (IEVV) for recessed mounting.

Low-voltage lighting systems intended for installation in accordance with Article 411 of the NEC in permanently installed cabinets, having a remote power source connected to a fixed wiring means, are covered under Low-voltage Incandescent Luminaires and Fittings (IFDR).

Portable cabinet luminaires investigated for use with specific cabinet or display designs are certified together with the cabinet or display as Furnishings, Household and Commercial (IYQX).

ADDITIONAL INFORMATION

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 153, "Portable Electric Luminaires."

Portable Cabinet Luminaires (QOVJ)—Continued

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Cabinet Luminaire," "Portable Cabinet Light" or "Portable Cabinet Luminaire Accessory."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LIGHT-EMITTING-DIODE LUMINAIRES, PORTABLE (QOVZ)

GENERAL

This category covers portable light-emitting-diode (LED) luminaires whose primary function is task or ambient illumination. These products are provided with a flexible cord and an attachment plug for connection to a nominal 120 V, 15 or 20 A branch circuit and intended for use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

This category also covers low-voltage LED lighting systems intended for installation under a shelf, cabinet, or similar structural surface, in accordance with Article 411 of the NEC, where the power supply is of the attachment-plug equipped, cord-connected type, or is a direct-plug-in type.

The individual certifications may include one or more Roman numerals (from II through XIV) that had previously been used to identify certain types of portable luminaires covered under that certification. This identification system is no longer in use, and these Roman numerals can be disregarded.

PRODUCT MARKINGS

Products investigated as Convertible Units are marked to indicate acceptability as a LED luminaire when used with the appropriate conversion kit.

Products investigated for use in wet locations are marked, in combination with the UL Certification Mark, "SUITABLE FOR WET LOCATIONS."

RELATED PRODUCTS

Portable electric hand lamps are covered under Portable Electric Hand Lamps (QORX).

Nightlights are covered under Nightlights (QOYX).

Portable LED luminaires that comply with the requirements in ANSI/UL 48, "Electric Signs," may also be certified as Signs (UXYT).

Unassembled portable luminaires are covered under Portable Luminaire Accessories, Kits and Subassemblies (QPAU).

ADDITIONAL INFORMATION

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 153, "Portable Electric Luminaires," and ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Light-emitting-diode Luminaire" (or "Portable LED Luminaire").

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUMINAIRES, PORTABLE (QOWZ)

GENERAL

This category covers portable luminaires (lamps) whose primary function is task or ambient illumination. These products are provided with a flexible cord and an attachment plug for connection to a nominal 120 V, 15

Luminaires, Portable (QOWZ)—Continued

or 20 A branch circuit and intended for use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

This category also covers low-voltage lighting systems intended for installation under a shelf, cabinet, or similar structural surface, in accordance with Article 411 of the NEC, where the power supply is of the attachment-plug-equipped, cord-connected type, or is a direct-plug-in type.

The individual certifications may include one or more Roman numerals (from II through XIV) that had previously been used to identify certain types of portable luminaires covered under that certification. This identification system is no longer in use, and these Roman numerals can be disregarded.

PRODUCT MARKINGS

Products investigated as Convertible Units are marked to indicate acceptability as a luminaire when used with the appropriate conversion kit.

Products investigated for use in wet locations are marked, in combination with the UL Certification Mark, "Suitable for Wet Locations."

REBUILT PRODUCTS

This category also covers portable luminaires that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt portable luminaires are factory rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt portable luminaires are subject to the same requirements as new portable luminaires.

RELATED PRODUCTS

Portable luminaires that comply with the requirements in ANSI/UL 48, "Electric Signs," may also be certified as Signs (UXYT).

Unassembled portable luminaires are covered under Portable Luminaire Accessories, Kits and Subassemblies (QPAU).

ADDITIONAL INFORMATION

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 153, "Portable Electric Luminaires."

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Luminaire" or "Rebuilt Portable Luminaire."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

NIGHTLIGHTS (QOYX)

USE

This category covers nightlights for direct-plug-in use in parallel-slot, general-purpose receptacles rated 15 or 20 A, 125 V.

RELATED PRODUCTS

Nightlights employing light-emitting-diode (LED) light sources may additionally be covered under Light-emitting-diode Nightlights (QOWC).

Lighting products intended for use as nightlights, but provided with a power-supply cord, are covered under Luminaires, Portable (QOWZ).

Parallel-blade-to-incandescent-lamp adapters are covered under Lampholders, Adapters (OLRX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1786, "Direct Plug-In Nightlights."

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as

Nightlights (QOYX)—Continued

illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nightlight."

The Listing Mark for this category requires the use of a holographic label.

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PORTABLE LUMINAIRE ACCESSORIES, KITS AND SUBASSEMBLIES (QPAU)

USE AND INSTALLATION

This category covers portable luminaire accessories, kits and subassemblies of the following types:

Portable Luminaire Accessory — The portable luminaire accessory is intended to be used with a portable luminaire and consists of components such as interconnecting cord sets, dimmer and switch assemblies, and conversion kits to enable the portable luminaire to be converted to a fixed unit (luminaire) in accordance with ANSI/UL 1598, "Luminaires."

Portable Luminaire Kit — The portable luminaire kit is intended to be used for making a complete portable luminaire using ordinary tools to assemble and/or attach the parts to a support base in accordance with the instructions provided with the kit. All parts needed to assemble the product in accordance with the instructions are provided.

Portable Luminaire Subassembly — The portable luminaire subassembly is intended to be used for modernizing, or replacing parts on existing luminaires in accordance with the instructions provided with the subassembly. It may also be used for constructing a new portable luminaire in accordance with the instructions provided with the subassembly. All electrical components needed to assemble the product in accordance with the instructions are provided.

MARKINGS AND INSTRUCTIONS

Portable luminaire accessory conversion kits are provided with mounting and installation instructions and markings to indicate that they are capable of being used as fixed units (luminaires) when used with the appropriate portable luminaires. The portable luminaires are identified by catalog or model number.

ADDITIONAL INFORMATION

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 153, "Portable Electric Luminaires."

Portable luminaire accessory conversion kits and their associated portable luminaires are additionally investigated to ANSI/UL 1598, "Luminaires."

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Portable Luminaire Accessory," "Portable Luminaire Kit," "Portable Lamp Subassembly" or "Portable Luminaire Subassembly."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PORTABLE WORK LIGHTS (QPCJ)

USE AND INSTALLATION

This category covers cord-and-plug-connected work lights for illumination of work areas, such as construction sites, loading docks and machinery work stations. Work lights are not intended to be hand held during use. Work lights are not intended for use in hazardous (classified) locations as defined in ANSI/NFPA 70, "National Electrical Code."

This category also covers work light accessories intended for use with specific work lights.

Work lights may be freestanding, clamp-on, or similar portable mounting means, or be provided with a means for mounting to a tool, machine or a similar movable object.

Portable Work Lights (QPCJ)—Continued

Work lights may be placed on combustible floors. Special care must be employed to avoid overturning and to keep away from draperies, furniture, etc.

PRODUCT MARKINGS

A work light marked "Dry Location Use" is intended to be used only in a dry location.

A work light marked "Suitable for Wet Location Use" is intended for use in a wet or dry location.

A work light marked "Suitable for Outdoor Use Only" is suitable for use in a wet location and is intended to be used only in an outdoor location.

RELATED PRODUCTS

Portable outdoor flood lights for illumination or landscape, outdoor decorations, patios and play areas are covered under Luminaires, Portable (QOWZ).

For other portable lighting products, see Luminaires, Portable (QOWZ) and Portable Electric Hand Lamps (QORX).

ADDITIONAL INFORMATION

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 153, "Portable Electric Luminaires."

Products employing LED light sources are additionally investigated to ANSI/UL 8750, "Light Emitting Diode (LED) Equipment for Use in Lighting Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Work Light," "Portable Work Light" or "Work Light Accessory."

The Listing Mark for this category requires the use of a holographic label.

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SUN AND HEAT LAMPS (QPDY)

USE

This category covers portable sun and heat lamps of the household variety intended for the production of ultraviolet (sun) radiation, infrared (heat) radiation, or both.

FACTORS NOT INVESTIGATED

The physiological effects, beneficial or otherwise, which may be produced by these lamps have not been investigated.

RELATED PRODUCTS

Sun and heat lamps intended for professional use are covered under Medical Equipment (PIDF).

Sun and heat equipment for household and commercial use is covered under Personal Sun and Heat Equipment (QGRX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 482, "Portable Sun/Heat Lamps." The limit for ultraviolet irradiation specified in ANSI/UL 482 is in agreement with the federal regulations specified in 21CFR1040.20, "Sun Lamp Products and Ultraviolet Lamps Intended for Use in Sun Lamp Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Infrared Lamp," "Ultra-Violet Lamp," "Heat Lamp" or "Sun Lamp."

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PORTABLE LUMINAIRES FOR USE IN HAZARDOUS LOCATIONS (QPKX)

GENERAL

This category covers portable luminaires (lighting units). Portable luminaires have provision for connection of a three-conductor, flexible, extra-hard-usage cord having a grounding conductor, and are provided with a seal between the lamp compartment and the terminal enclosure.

Connections to the fixed portion of the supply require the use of receptacles with plugs or receptacles with plugs interlocked with snap switches, or their equivalent, certified for the specified hazardous locations. The flexible cord connected to the units should be frequently examined and replaced when necessary. Terminal connections should be properly made and maintained.

Authorities Having Jurisdiction should be consulted with regard to conditions under which these portable devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/UL 844, "Luminaires for Use in Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Lighting Unit for Hazardous Locations" or "Portable Luminaire for Use in Hazardous Locations."

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PORTABLE POWER CABLE (QPMU)

GENERAL

This category covers portable power cable constructed and certified for use in accordance with Article 400 of ANSI/NFPA 70, "National Electrical Code" (NEC). Portable power cable consists of either a single insulated conductor or two or more insulated conductors, with or without grounding conductors, with an overall fiber reinforced jacket. The insulation and jacket are thermost on Types G, G-GC and W, and thermoplastic elastomer on Type PPE.

This cable is used to supply power to mobile equipment and machinery and is rated 2000 V, 90°C (194°F) dry, and 60°C (140°F) where exposed to oil. For cable so marked, ratings of 60°C (140°F), 75°C (167°F), or 90°C (194°F) "wet" are also assigned. The term "wet" indicates that the cable is acceptable for immersion in water. Cable that has been investigated for use where exposed to the direct rays of the sun is marked "Sunlight Resistant" or "Sun Res."

Portable power cable employs flexible stranded copper conductors in a size range of 12 AWG to 500 kcmil, except for single conductor Type W and single conductor Type PPE which employs flexible stranded copper conductors in sizes 12 AWG to 1000 kcmil. Ampacities for portable power cable can be found in Table 400.5(B) of the NEC.

Type G — Contains 2 – 6 circuit conductors and a grounding conductor. The grounding conductor is either bare or covered with a green-colored braid or tape, and may either be a single conductor or be sectioned into two or more parts.

Type G-GC — Same as Type G except that the cable also contains one, 12 AWG or larger, yellow insulated conductor which is used as a ground check.

Type W — Contains 1 – 6 circuit conductors and may or may not contain a grounding conductor. If included, the grounding conductor is fully insulated.

Type PPE — Contains 1 – 6 circuit conductors and may or may not contain a grounding conductor. If included, the grounding conductor is fully insulated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1650, "Outline of Investigation for Portable Power Cable."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Power Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

POWER AND CONTROL TRAY CABLE (QPOR)

GENERAL

This category covers Type TC power and control tray cable intended for use in accordance with Article 336 of ANSI/NFPA 70, "National Electrical Code" (NEC). The cable consists of one or more pairs of thermocouple extension wires or two or more insulated conductors, with or without one or more grounding conductors, with or without one or more optical fiber members and covered with a nonmetallic jacket. A single grounding conductor may be insulated or bare and may be sectioned. Any additional grounding conductor is fully insulated and has a distinctive surface marking. The cable is rated 600 or 2000 V.

The cable is certified in conductor sizes 18 AWG to 1000 kcmil copper or 12 AWG to 1000 kcmil aluminum or copper-clad aluminum. Conductor sizes within a cable may be mixed. Thermocouple extension conductors are certified in sizes 24 to 12 AWG.

PRODUCT MARKINGS

Cable with copper-clad aluminum conductors is surfaced printed "AL (CU-CLAD)" or "Cu-clad Al."

Cable with aluminum conductors is surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors." For termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

If the type designation of the conductors is marked on the outside surface of the cable, the temperature rating of the cable corresponds to the rating of the individual conductors. When this marking does not appear, the temperature rating of the cable is 60°C unless otherwise marked on the surface of the cable.

Cable investigated for use where exposed to direct rays of the sun is marked "sunlight resistant."

Cable investigated for direct burial in the earth is so identified.

Cable suitable for use between cable trays and utilization equipment in accordance with NEC 336.10(7) is surface marked with the suffix "-ER."

Cable consisting of thermocouple extension wires is surface marked "THCPL EXTN," "For thermocouple extension use only" or "Thermocouple extension wire only."

Cable surface marked "Oil Resistant I" (or "Oil Res I") is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is surface marked "Oil Resistant II" (or "Oil Res II").

Cable that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surface marked with the suffix "-LS."

Cable containing optical fiber members is identified with the suffix "-OF."

Regarding cable seals outlined in Article 501 of the NEC, Type TC cable has a sheath which is considered to be gas/vapor tight but the cable has not been investigated for transmission of gases or vapors through its core.

RELATED PRODUCTS

Connectors and fittings for use with this cable are covered under Power and Control Tray Cable Connectors (QPOZ).

Some connectors and fittings covered under Outlet Bushings and Fittings (QCRV), Nonmetallic-sheathed-cable Connectors (PXJV) and Service-entrance-cable Fittings (TYZX) are also suitable for use with this cable when specifically marked on the device or carton.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1277, "Electrical Power and Control Tray Cables with Optional Optical-Fiber Members."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Power and control tray cable that contains copper or copper-clad aluminum conductors has the product name "Power and Control Tray Cable Type TC"; power and control tray cable that contains aluminum conductors has the product name "Aluminum Power and Control Tray Cable Type TC."

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POWER AND CONTROL TRAY CABLE CONNECTORS (QPOZ)

USE

This category covers power and control tray cable connectors intended for use with Type TC cable. These connectors are intended for installation and use in accordance with the following information and the limitations specified in Power and Control Tray Cable (QPOR).

All male threaded fittings have only been investigated for use with lock-nuts.

Reusability — Connectors have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction.

PRODUCT MARKINGS

The connector or smallest unit shipping carton for the connectors is marked with the smallest and largest cable diameters for which the connectors have been investigated. In addition, the connectors or cartons are marked "Dry Location," "Sunlight Resistant," "Oil Resistant I" or "Oil Resistant II." Cable connectors marked "Oil Resistant I" are suitable for exposure to mineral oil at 60°C. Cable connectors marked "Oil Resistant II" are suitable for exposure to mineral oil at 75°C.

Some connectors are also acceptable for use with armored cable, flexible metal conduit, nonmetallic-sheathed cable, cord or service-entrance cable when marked on the device or carton.

ADDITIONAL INFORMATION

For additional information, see Power and Control Tray Cable (QPOR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Tray Cable Connector."

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POWER CONVERTERS/INVERTERS AND POWER CONVERTER/INVERTER SYSTEMS (QPPY)

USE AND INSTALLATION

This category covers (1) fixed and stationary power converters, power inverters, power converter systems and power inverter systems for use in recreational vehicles in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC), (2) portable, stationary and fixed power converters, power inverters, power converter systems and power inverter systems for use in land vehicles, and (3) accessories for power converters and power inverters.

Power converters are primarily rectifying units intended for connection to a 120 V or 120/240 V, 15 or 20 A branch circuit supplied from the recreational vehicle panelboard and designed to provide low direct voltage for equipment in the recreational vehicle. A power converter may also include a battery charging feature.

Power inverters are intended for connection to a battery source within a land vehicle. They are designed to supply ac voltage for equipment in a land vehicle. A power inverter may be provided with an ac transfer option to supply the output from an ac distribution system when the inverter is connected to such a system. A power inverter may also include a battery charger feature.

Power converter systems consist of a power converter and not more than three integral line voltage branch circuit protective devices unless marked "Distribution Panelboard." Power inverter systems consist of a power inverter and not more than three integral line voltage branch circuit protective devices unless marked "Distribution Panelboard." A main disconnecting means is provided if more than two branch circuit protective devices are incorporated.

A power converter system or power inverter system may serve the function of a distribution panelboard in a land vehicle. They are intended to be connected directly to an ac distribution system by means of a power-supply cord.

DISTRIBUTION PANELBOARDS

Some certified power converter systems or power inverter systems consist of a line voltage branch circuit section with more than three integral line voltage branch circuit protective devices. The line voltage compartment, including the overall enclosure for that compartment, complies with ANSI/UL 67, "Panelboards," and is intended to be installed in accordance with Article 551 of the NEC. Such power converter or inverter systems are identified as a "Distribution Panelboard" or the equivalent.

REBUILT PRODUCTS

This category also covers units that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt units are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt units are subject to the same requirements as new products.

RELATED PRODUCTS

Land vehicle main distribution centers without integral power converter/inverter functions are covered under Panelboards (QEUY).

Power converters, power inverters, power converter systems and power inverter systems for use on a marine craft are covered under Power Converters/Inverters and Power Converter/Inverter Systems, Marine (QPQL).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 458, "Power Converters/Inverters and Power Converter/Inverter Systems for Land Vehicles and Marine Crafts."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Power Converter," "Power Inverter," "Power Converter System," "Power Inverter System," or other appropriate product name as shown in the individual Listings.

For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

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POWER DISTRIBUTION BLOCKS (QPQS)

USE

This category covers power distribution blocks rated 600 V or less and intended to be used on the load side of service equipment.

Power distribution blocks are used for splicing and tapping conductors in metallic wireways, auxiliary gutters, cabinets, cutout boxes, termination boxes, and the like, or enclosures designed for the purpose in order to distribute power to separate circuits or loads.

A power distribution block consists of one or more terminal wire connectors mounted on an insulating base. Each connector has provisions for one or more incoming run conductors and multiple tap conductors. A tap con-

ductor is of the same or smaller size as the incoming run conductor. The connectors may be of the lay-in construction, which do not require the incoming run conductor to be terminated.

A power distribution block may be provided with an insulating cover.

INSTALLATION

Power distribution blocks are intended for use in installations covered by ANSI/NFPA 70, "National Electrical Code" (NEC), and installed using the manufacturer's installation instructions. Wiring space (75% cross-sectional fill), wire bending space, and final exposure of any uninsulated live parts are determined by the installer and Authority Having Jurisdiction at each installation in accordance with Section 376.56 of the NEC when the power distribution block is installed in the enclosure.

Power distribution blocks provided with an insulating cover have been investigated for nonexposure of uninsulated live parts in a wireway, whether or not the wireway cover is installed.

Installation instructions are provided for proper mounting and use.

PRODUCT MARKINGS AND RATINGS

Power distribution blocks are considered suitable for use on circuits having available fault current not greater than 10,000 rms symmetrical amps, unless marked with a larger value. Power distribution blocks are marked "Short-Circuit Current Rating" together with the value of the rating and the maximum voltage. A power distribution block may additionally be marked to identify an overcurrent protective device (fuse or circuit breaker) to be used ahead of the power distribution block.

Power distribution blocks are marked to indicate that they are for use in specific enclosures (identified by either catalog number or specific dimensional information).

Unless the power distribution block is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14-1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger as specified in Table 310.16 of the (NEC). Termination provisions are determined based on values provided in Table 310.16 or Section 310.15(B)(6), with no adjustment made for correction factors.

Power distribution blocks are marked with the following:

- a) the letters "AL" to indicate use with aluminum conductors only; "CU" to indicate for use with copper conductors only; or "CU" and "AL" to indicate for use with either type of conductor
- b) a "7" or "9" in conjunction with the "AL" or "AL-CU" marking. This marking corresponds with the marking on the individual connector (e.g., AL7CU, AL9)
- c) the torque associated with each conductor tightening means
- d) an ampere rating that signifies the maximum current per pole
- e) a voltage rating
- f) the wire size (or range) for each connector

An insulating cover of a power distribution block is marked with the catalog number of the of the power distribution block for which it is intended.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1953, "Outline of Investigation for Power Distribution Blocks."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Distribution Block."

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POWER DISTRIBUTION CENTERS FOR COMMUNICATIONS EQUIPMENT (QPQY)

GENERAL

This category covers power distribution centers for communications equipment rated 600 V or less.

Power distribution centers contain equipment such as circuit breakers, supplementary protectors, contactors, fuses, switches, including pullout types and related accessory equipment.

Some centers incorporate constructions designed to provide safety for the operator. These centers are dead-front but may be open at the back,

bottom, top or sides. Other centers may employ special alarm indicating fuses that have exposed live parts extending through the front. The distribution centers that incorporate special alarm fuses or that are not provided with a complete enclosure are intended for installation in places accessible only to qualified persons and are so marked.

INSTALLATION

Some equipment has been investigated for installation in a restricted-access location, such as a dedicated equipment room or telecommunications equipment closet, where access is limited to trained service personnel. Such equipment is provided with a marking or installation instructions, stating "To be installed only in a Restricted Access Location," or similar wording. Equipment installed in a restricted-access location generally receives power from a centralized dc power source. If field-wiring terminals are not contained in an internal compartment, both protection of exposed wiring terminals and wiring methods used for such equipment are intended to be provided in accordance with (1) markings on or instructions with the equipment, and (2) the provisions of Sections 110.26 and 110.27 of ANSI/NFPA 70, "National Electrical Code" (NEC).

A certified subassembly such as a fuse panel, circuit breaker panel or the like has been investigated for use in a power distribution center or cabinet and is suitable for field installation. The subassembly is installed in accordance with the manufacturer's installation instructions, and the catalog number or equivalent of the subassembly and power distribution center or cabinet is referenced in the instructions.

PRODUCT MARKINGS

Power distribution centers are marked with their short circuit current rating. This marking may be presented as a dc rating in amps, a description of the battery power supply, such as "Suitable For Use In Circuits Powered By Up To Five Banks Of 48 V, 200 A-Hr. Batteries," or a combination of both. A battery "bank" consists of a sufficient number of series-connected batteries to obtain the required system voltage. A number of "banks" are then wired in parallel to obtain the desired system A-Hr. capacity.

A distribution center having provision for the field installation of additional equipment such as circuit breakers, contactors, switches or the like is marked with the name or trademark of the manufacturer and the catalog number or equivalent of those devices that are intended to be installed in the field.

Power distribution centers are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14 - 1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger as specified in Table 310.15(B)(16) of the NEC.

RELATED EQUIPMENT

Power supplies for information technology and telecommunications equipment are covered under Power Supplies, Information Technology Equipment Including Electrical Business Equipment (QQGQ) and Power Supplies, Telephone (QQJE).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 60950, "Safety of Information Technology Equipment," or ANSI/UL 60950-1, "Information Technology Equipment - Safety - Part 1: General Requirements" (1st edition), in addition to the requirements contained in UL Subject 1801, "Outline of Investigation for Power Distribution Centers for Communications Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Distribution Center for Communications Equipment" or "Power Distribution Center for Communications Equipment Subassembly."

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**POWER DISTRIBUTION EQUIPMENT,
PORTABLE (QPRW)****USE**

This category covers portable power distribution units and devices, and portable power distribution panels intended for use in the following locations:

- Carnivals, circuses, fairs and similar locations in accordance with Article 525 of ANSI/NFPA 70, "National Electrical Code" (NEC)
- Exhibition halls or similar locations in accordance with Article 518 of the NEC
- Theaters, audience areas of motion picture and television studios and similar locations in accordance with Article 520 of the NEC
- Motion picture and television studios and similar locations in accordance with Article 530 of the NEC
- Temporary installations at construction sites in accordance with Article 590 of the NEC

RATINGS

This category covers units rated 600 V or less, single- or multi-phase. Units are rated maximum 1600 A.

Short-circuit Rating — Units are intended for connection to supplies with a maximum available fault current of 10,000 A.

PRODUCT MARKINGS

Accessibility — Units intended for use in areas not accessible by the general public are marked "For Use in Areas Not Readily Accessible by the General Public."

Conductors in Parallel — Units intended for paralleled conductors on a single circuit are marked "WARNING – Risk of Fire – Not for Multiple Circuits. Single Circuit with Parallel Conductors Only."

Duty Rating — Outputs are not suitable for continuous use unless marked otherwise.

Ground-fault Protection — Only those receptacles so marked are provided with ground-fault circuit protection for personnel.

Neutral Connection — Equipment rated for use on 3-phase, 4-wire with ground supplies and intended for use with electronic dimmers are marked "130 Percent Neutral – Suitable for Use with Electronic Dimmers." Equipment for use on both 208Y-/120-volt, 3-phase, 4-wire and 120-/240-volt, single-phase supplies at the full current rating on both systems are marked "200 Percent Neutral."

Qualified Personnel — Units intended for use by qualified personnel are marked "FOR USE BY QUALIFIED PERSONNEL ONLY" and "The routing of portable supply conductors, the making and breaking of supply connectors, and the energization and de-energization of supply services shall be performed by qualified personnel only."

Enclosure Type — Enclosures are marked with a Type designation indicating the external conditions for which they are intended. Intended uses for the various Type designations are indicated in Electrical Equipment for Use in Ordinary Locations (AALZ). Enclosures may additionally be marked with descriptive terms such as "Raintight," "Watertight," "Corrosion Resistant" and the like.

Receptacle Ratings — Equipment with receptacles that are not suitable to be disconnected under load are marked "Do Not Disconnect Under Load," or other similar marking to indicate the limitation of the receptacle.

Single-pole Inlets and Outlets — Equipment with separate, single-pole devices for input or output and without sequential interlocking provisions are marked "WARNING — Risk of Electric Shock. Plug connection should be in the following order:

- a) Equipment grounding conductor connectors,
- b) Grounded circuit conductor connectors, and
- c) Ungrounded conductor connectors.

Disconnection should be in reverse order."

RELATED PRODUCTS

Units intended for use in theater or studio rigging immediately adjacent to stage luminaires are covered under Stage and Studio Luminaires, Accessories and Connector Strips (IFDZ).

Portable cord-connected units rated 250 V ac or less, 20 A or less, intended for indoor use as multiple-outlet extensions of a branch circuit to a central location to supply laboratory equipment, a home workshop, home movie lighting control, etc., are covered under Relocatable Power Taps (XBYS).

Connector assemblies consisting of only factory-assembled plugs and cord connectors attached to extra-hard service cords or cables are covered under Cord Sets and Power-supply Cords (ELBZ).

Connector assemblies consisting of only factory-assembled plugs and cord connectors attached to extra-hard service cords or cables that are intended specifically and solely for undercarpet use at tradeshows are covered as undercarpet cord sets under Exhibition Display Units, Accessories (XNRU).

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**PORTABLE POWER DISTRIBUTION UNITS
AND DEVICES (QPSH)****GENERAL**

This category covers portable power distribution equipment of standard-sized type or configuration. Each unit has a marked model, type or catalog number.

Portable power distribution units are assemblies of Listed products, recognized components, or both, contained in complete electrical enclosures. They may incorporate disconnecting means, overcurrent devices, control components, receptacles for attachment plugs, stage and studio type inlets and connectors, and the like.

This category also covers cable-mounted busbar clamps for use with portable power distribution units as well as partially enclosed, plastic framed cable splicing blocks.

Busbar Clamps (Sister Lugs)

Busbar clamps are intended for use by qualified personnel only. Cable terminating to busbar clamps should be tied or otherwise supported so that flexing or strain on the conductors is not transmitted to the conductor termination at the busbar clamp. Solder lug-type units are not suitable to terminate an equipment grounding conductor. Busbar clamps are marked with their range of intended wire sizes and their maximum current rating.

Cable Splicing Blocks (Spiders)

Partially enclosed, plastic framed cable splicing blocks are suitable for outdoor use, damp locations. They are suitable to be exposed to rain or water spray when not energized. Following such an exposure they are intended to be dried and inspected prior to energization. They are intended for use by qualified personnel in areas not readily accessible by the general public. They are intended for installations covered by Articles 520 and 530 of ANSI/NFPA 70, "National Electrical Code."

Construction Site Units

Units identified as "Construction Site Portable Power Distribution Units" or with similar identifiers that are marked as providing ground-fault protection for personnel protect the output circuits in the presence of one or more of the following conditions:

1. Any two power supply conductors are reversed
2. There is an open circuit in either the grounded supply conductor or any of the ungrounded supply conductors

Protection is provided by exhibiting the performance characteristics of a Class A ground-fault circuit-interrupter or by de-energizing the protected output circuits.

ADDITIONAL INFORMATION

For additional information, see Power Distribution Equipment, Portable (QPRW) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1640, "Portable Power-Distribution Units."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify portable power distribution units manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Power Distribution Unit" (or "Port Pwr Dist Unit") or "Construction Site Portable Power Distribution Unit" (or "Construction Site Port Pwr Dist Unit"). The word "Equipment" may be substituted for "Unit."

The Listing Mark for partially enclosed, plastic framed cable splicing blocks is the same as that specified above except the product name is "Open Frame Cable Splicing Block."

The Listing Mark of UL on the smallest unit container in which busbar clamps are packaged and additionally provided with the UL symbol on the busbar clamp is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Busbar Clamp."

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**PORTABLE POWER DISTRIBUTION PANELS
(QPSP)****USE**

This category covers portable power distribution panels built for specific applications.

POWER DISTRIBUTION EQUIPMENT, PORTABLE (QPRW)

Portable Power Distribution Panels (QPSM)—Continued

These products are assemblies of certified products and/or components, contained in complete electrical enclosures. They may incorporate disconnecting means, overcurrent devices, receptacles for attachment plugs, stage and studio type inlets and connectors, and the like.

These panels are intended for use in applications specified for portable power distribution units in ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Power Distribution Equipment, Portable (QPRW) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1640, "Portable Power-Distribution Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Power Distribution Panel."

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POWER-LIMITED CIRCUIT CABLE
(QPTZ)

USE

This category covers power-limited circuit cable intended for use in Class 2 or Class 3 circuits as described in Article 725 of ANSI/NFPA 70, "National Electrical Code" (NEC).

PRODUCT MARKINGS

Cable with a nonmetallic jacket is identified by a marking on the surface of the jacket or on a marker tape under the jacket. Cable with an outer metal sheath is identified by a marker tape under the armor. This marking includes one of the following Type designations:

CL2P or CL3P — Indicates cable intended for use in Class 2 or Class 3 circuits within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 725.154(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested per ANSI/NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

CL2R or CL3R — Indicates cable intended for use in Class 2 or Class 3 circuits within buildings in vertical shafts in accordance with Section 725.154(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per ANSI/UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

CL2 or CL3 — Indicates cable intended for general use in Class 2 or Class 3 circuits within buildings in accordance with Section 725.154(C) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

CL2X or CL3X — Indicates cable intended for use in Class 2 or Class 3 circuits within buildings (1) where the cable is enclosed in raceway or noncombustible tubing, or (2) in nonconcealed spaces where the exposed length of cable does not exceed 10 ft, or (3) in one- or two-family or multi-family dwellings when the cable diameter is less than 0.25 in., in accordance with Section 725.154(E) of the NEC. This cable complies with the VW-1 Flame Test requirements in ANSI/UL 1581.

PLTC — Indicates cable for use in Class 3 circuits within buildings that is suitable for use in cable trays, in accordance with Sections 725.154(C) and (D) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1685.

Cable marked "direct burial," "for direct burial" or "dir bur" is suitable for direct burial in the earth.

Type PLTC cable and cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

Cable marked "wet" or "wet location" is suitable for use in wet locations.

Cable marked "-30C," "-40C," "-50C," "-60C" or "-70C" complies with a cold bend test conducted at that temperature.

Cable that complies with the requirements for "Limited Combustible" specified in ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilation Systems," is surface marked "Limited Combustible."

POWER-LIMITED CIRCUIT CABLE (QPTZ)

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Type PLTC cable permitted to be exposed between cable trays and utilization equipment in accordance with Section 725.61(D)(4) of the NEC is surface marked with the supplementary letters "-ER" (formerly marked "open wiring").

Cable marked "-CI (max voltage ____)" is suitable for use as circuit-integrity cable at the maximum voltage to ground indicated, in accordance with Section 725.179(F) of the NEC.

Cable marked "CI (max voltage ____)" is intended for use in free air only.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 13, "Power-Limited Circuit Cables."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power-limited Circuit Cable."

Cable verified to another transmission performance specification has the Marking "Verified In Accordance With [Specification name and/or number]" together with the Listing Mark information on the tag, reel or smallest unit container.

The Listing Mark for this category requires the use of a holographic label.

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POWER OUTLETS AND POWER-
OUTLET FITTINGS (QPYV)

GENERAL

This category covers power outlets and power-outlet fittings.

Power outlets are enclosed assemblies that may include components such as receptacles, circuit breakers, fuseholders, fused switches, buses, and watt-hour meter-mounting means. Power outlets are permanently installed and, although not restricted to such use, are intended for use:

- At outdoor locations, such as on farms, at building sites, and the like, where power is required to operate portable, mobile, or temporarily installed equipment
- To supply power to a mobile home or a recreational vehicle
- To supply shore power to boats

Power-outlet fittings may be panels or combination units incorporating receptacles, disconnecting means, overcurrent protection or other such devices. A separable mounting post or pedestal to which power outlets are to be mounted is also considered a fitting. Power-outlet fittings are intended for factory or field assembly into or in conjunction with specific power outlets. Power outlets are marked to indicate those fittings with which they are intended to be used.

USE AND INSTALLATION

Power outlets are mounted using a post or pedestal, each detailed as follows:

Post type power outlets are intended to be mounted in concrete at or below grade level, or intended to be secured to some other mounting support. The mounting post contains markings indicating the proper grade level.

Pedestal type power outlets are intended for mounting on a concrete slab.

Unless marked otherwise, a mounting post, pedestal or fitting is not intended to serve as the sole support of a mast for overhead wiring.

Power outlets are not intended for use in recreational vehicle parks or in marinas unless so marked.

Where intended for use as service equipment for mobile homes, temporary sites, marinas and boatyards, or any combination of these, the appropriate wording appears in the marking "Suitable For Use As Service Equipment For ____." Power outlets so marked for use as service equipment are provided with factory installed or field installable overcurrent protection and disconnecting means for service conductors, as well as means for grounding the service neutral conductor.

Power outlets not marked for a specific service use (as described in the previous paragraph) and not incorporating receptacles are suitable as ser-

vice equipment if marked "Suitable For Use As Service Equipment," or where the neutral is factory bonded to the enclosure, "Suitable For Use Only As Service Equipment."

Power outlets containing overcurrent protection are marked with their short-circuit current ratings in rms symmetrical amps.

Where in normal operation the load will continue for three hours or more, molded-case circuit breakers and fuses should not be loaded to exceed 80% of their current rating.

Investigation of a power outlet includes a test designed to simulate exposure to beating rain to determine that such exposure will not interfere with successful operation of the apparatus within the enclosure nor result in wetting of the exposed faces of receptacles and associated attachment plugs.

Power outlets are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings are independent of any marking on terminal connectors and on a wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14-1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger as specified in Table 310.16 of ANSI/NFPA 70, "National Electrical Code." Termination provisions are determined based on values provided in Table 310.16, with no adjustment made for correction factors.

RELATED PRODUCTS

Portable power distribution equipment is covered under Portable Power Distribution Units and Devices (QPSH) and Portable Power Distribution Panels (QPSM).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 231, "Power Outlets."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Outlet" or "Power Outlet Fitting."

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POWER SUPPLIES (QQAQ)

These categories cover the following types of power supplies intended for use in ordinary locations in accordance with the National Electrical Code.

- General Purpose Power Supplies
- Specialty Power Supplies
- Telephone Power Supplies
- Gas Tube Sign Power Supplies
- Information Technology Equipment Power Supplies

The investigation of a device covered in these categories does not include the effects it may have on the system or equipment connected thereto.

Power supplies intended as components of fire protective signaling systems and burglary protective signaling systems equipment are covered under their respective categories.

Power supplies for use in health care facilities are covered under under Power Supplies for use in Health Care Facilities, Guide KFCC.

Power supplies classified in accordance with IEC publications are covered under Power Supplies Classified In Accordance With IEC Publications, Guide QQQV.

Power supplies for use in recreational vehicles are listed in this directory under Power Converters and Power Converter Systems, Guide QPPY.

A power supply not covered under one of the above mentioned categories and for use with only a specific product may be covered under the category of the specific product.

The Listing Mark of UL on products covered under these categories does not extend to connected equipment.

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POWER SUPPLIES, GENERAL PURPOSE (QQFU)

GENERAL

This category covers indoor- and outdoor-use power supplies having input ratings of not more than 600 V, direct and alternating current.

Power supplies identified with an enclosure type designation or as "Rain-tight" or "Rainproof" are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Power supplies marked "Intended for Installation in a Protected Environment" or the equivalent are intended to be used in a temperature- and humidity-controlled indoor area that is relatively free of conductive contaminate.

REBUILT PRODUCTS

This category also covers power supplies that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new power supplies.

ADDITIONAL INFORMATION

For additional information, see Power Supplies (QQAQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1012, "Power Units Other Than Class 2."

Products investigated for use in air-handling spaces are marked "Suitable for Use in Other Environmental Air Space in Accordance with Section 300.22(C) of the National Electrical Code," or "Suitable for Use in Air-Handling Spaces," and have been additionally investigated to UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces." Products that bear this marking are suitable for installation in accordance with Article 300 of ANSI/NFPA 70, "National Electrical Code," Chapter 4 of ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," Section 602 of the "International Mechanical Code," and Section 602 of the "Uniform Mechanical Code."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Supply."

For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

POWER SUPPLIES, INFORMATION TECHNOLOGY EQUIPMENT INCLUDING ELECTRICAL BUSINESS EQUIPMENT (QQGQ)

GENERAL

This category covers power supplies rated 600 V or less, intended for use with information technology equipment (ITE) including electrical business equipment. End-use products that employ these types of power supplies are covered under Information Technology Equipment Including Electrical Business Equipment (NWGQ).

These power supplies are stand-alone units that deliver power to ITE via external interconnecting means.

This category also covers modular accessory power supplies. Such power supplies are types that are intended for field installation within personal computers, similar ITE, including telephone equipment. These modular power supplies are also provided with installation instructions relative to safe installation.

All power-supply types covered under this category are marked with input and output ratings that include the voltage and intended maximum load rating in amperes.

When power supplies intended for use with a detachable power-supply cord are not provided with such a cord, a cord suitable for connection of the equipment to the branch circuit is to be separately provided.

The investigation of a product covered under this category does not include the effects it may have on the system or equipment to which it is connected.

REBUILT PRODUCTS

Power Supplies, Information Technology Equipment Including Electrical Business Equipment (QQGQ)—Continued

This category also covers power supplies that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new power supplies.

ADDITIONAL INFORMATION

For additional information, see Power Supplies (QQAQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 60950-1, "Information Technology Equipment – Safety – Part 1: General Requirements," and ANSI/UL 60950-22, "Information Technology Equipment – Safety – Part 22: Equipment to be Installed Outdoors."

All low-voltage outputs (maximum 42.4 V peak or 60 V dc) are safety extra-low-voltage (SELV) as defined in ANSI/UL 60950-1, and, where noted in the test report, SELV for wet locations as defined in ANSI/UL 60950-22. An output marked "LPS" has been determined to have an output level at or below the limited power-source level specified in ANSI/UL 60950-1, as it relates to the requirements for equipment supplied by the output.

An output marked "Class 2" has additionally been investigated to ANSI/UL 1310, "Class 2 Power Units."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number or file number, and the category identifier "Information Technology Equipment Power Supply" (or "I.T.E. Power Supply" or "ITE Power Supply"), "QQGQ Power Supply," or the standard number with or without the "ANSI/UL" prefix (e.g., "ANSI/UL 60950-1," "60950-1").

For accessories, the Listing Mark is applied to modular accessory power supplies on an external surface that will be enclosed within the end-use product. The category identifier for accessories includes the word "Accessory."

For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

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POWER SUPPLIES, SPECIALTY (QIQI)

USE

This category covers indoor- and outdoor-use power supplies having input ratings of not more than 600 V, direct and alternating current.

These power supplies are intended for, but not necessarily limited to, specific uses such as to supply some household appliances, electroplating equipment, school laboratory equipment, pipe organs, cathodic protection equipment, power supply/battery charger combinations, and industrial equipment, including inverters and converters.

This category also covers permanently connected Class 2 power units. Other types of Class 2 power units are covered under Transformers, Class 2, Class 3 (XOKV) and Direct-plug-in and Cord-connected Class 2 Power Units (EPBU).

Power supplies identified with an enclosure type designation or as "Rain tight" or "Rainproof" are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

REBUILT PRODUCTS

This category also covers power supplies that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new power supplies.

PRODUCT MARKINGS

Power supplies marked "Intended for installation in a protected environment" or the equivalent are intended to be used in a temperature- and humidity-controlled indoor area that is relatively free of conductive contaminate.

RELATED PRODUCTS

See Power Supplies, General Purpose (QQFU).

ADDITIONAL INFORMATION

For additional information, see Power Supplies (QQAQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

Power Supplies, Specialty (QQII)—Continued

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1012, "Power Units Other Than Class 2."

Products with a marked Class 2 output have been additionally investigated to ANSI/UL 1310, "Class 2 Power Units."

Products investigated for use in air-handling spaces are marked "Suitable for Use in Other Environmental Air Space in Accordance with Section 300.22(C) of the National Electrical Code," or "Suitable for Use in Air-Handling Spaces," and have been additionally investigated to UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces." Products that bear this marking are suitable for installation in accordance with Article 300 of ANSI/NFPA 70, "National Electrical Code," Chapter 4 of ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," Section 602 of the "International Mechanical Code," and Section 602 of the "Uniform Mechanical Code."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the appropriate product name as shown in the individual Listings.

For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

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POWER SUPPLIES, TELEPHONE (QQJE)

GENERAL

This category covers telephone power supplies having input ratings of not more than 600 V, direct and alternating current, intended for use with telephone exchange equipment, telephone appliances, and telephone accessories.

REBUILT PRODUCTS

This category also covers telephone power supplies that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt telephone power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt telephone power supplies are subject to the same requirements as new telephone power supplies.

RELATED PRODUCTS

See Power Supplies, General Purpose (QQFU).

ADDITIONAL INFORMATION

For additional information, see Power Supplies (QQAQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1459, "Telephone Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Telephone Power Supply."

For rebuilt products, the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

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POWER SUPPLIES FOR USE WITH AUDIO/VIDEO, INFORMATION AND COMMUNICATION TECHNOLOGY EQUIPMENT (QQJQ)

GENERAL

This category covers power supplies rated 600 V or less, intended for use with products covered under Audio/Video Equipment (AZOE), Communication Technology Equipment (AZOJ) and Information Technology Equipment (AZOT).

PRODUCT CATEGORIES BY CATEGORY CODE

Power Supplies for Use with Audio/Video, Information and Communication Technology Equipment (QQJQ)—Continued

These power supplies are stand-alone units that deliver power to the above end-use products via external interconnecting means.

This category also covers modular accessory power supplies. Such power supplies are types that are intended for field installation within computing, telecommunication, or similar equipment. These modular power supplies are also provided with installation instructions relative to safe installation.

All power-supply types covered under this category are marked with input and output ratings that include the voltage and intended maximum load rating in amperes.

When power supplies intended for use with a detachable power-supply cord are not provided with such a cord, a cord suitable for connection of the equipment to the branch circuit will be separately provided.

The investigation of a product covered under this category does not include the effects it may have on the specific system or equipment to which it is connected.

ADDITIONAL INFORMATION

For additional information, see Power Supplies (QQAQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 62368-1, "Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements."

All low-voltage outputs are Class 1 electrical energy sources (ES1) as defined in ANSI/UL 62368-1. An output marked "LPS," "PS1" or "PS2" has been determined to have an output level at or below the limited power-source level, Class 1 electrical power source (PS1) or Class 2 electrical power source (PS2), respectively, specified in ANSI/UL 62368-1, as it relates to the requirements for equipment supplied by the output.

An output marked "Class 2" has additionally been investigated to ANSI/UL 1310, "Class 2 Power Units."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Supply," or other appropriate product name as shown in the individual Listings.

For accessories, the Listing Mark is applied to modular accessory power supplies on an external surface that will be enclosed within the end-use product. The category identifier for accessories includes the word "Accessory."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

NONMETALLIC UNDERGROUND CONDUIT WITH CONDUCTORS (QQRK)

USE AND INSTALLATION

This category covers cable, which is a factory assembly of one or more certified insulated wires or cables, and may include one or more insulated or bare equipment grounding conductor(s), all enclosed in a high-density polyethylene conduit, intended for underground installation in accordance with Article 354 of ANSI/NFPA 70, "National Electrical Code" (NEC), or for highway lighting, utility company installations and similar uses not within the scope of the NEC. This product is intended for installation and use in accordance with the following information.

The range of trade sizes is from 1/2 in. to 4 (metric designators 16 to 103) inclusive.

The product is intended for embedment in concrete and/or for direct burial in the earth to a depth specified in the NEC, or by the Authority Having Jurisdiction.

The product is provided in a continuous length on a reel and intended to be installed without splices underground. The ends of cable runs are intended to be stubbed-up through concrete or directly from earth into equipment enclosures, cabinets or lighting-pole bases.

Conductors in the cable are rated 600 V or higher and are suitable for use in wet and dry locations. The conductors fill the internal cross section of the tube in accordance with Chapter 9 of the NEC.

For cable rated 600 V through 35 kV, the voltage ratings of all conductors in a construction are the same. The ampacity of the conductors is to be

NONMETALLIC UNDERGROUND CONDUIT WITH CONDUCTORS (QQRK)

determined on the basis of the AWG size, the temperature ratings of the conductors, and the number of current-carrying conductors in the cable, in accordance with the NEC.

The smallest radius to which the cable may be bent in the installation is:

Trade Size	Metric Designator	Min Bending Radius (in.)
1/2	16	10
3/4	21	12
1	27	14
1-1/4	35	18
1-1/2	41	20
2	53	26
2-1/2	63	36
3	78	48
4	103	60

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1990, "Nonmetallic Underground Conduit with Conductors."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Preassembled Cable in Nonmetallic Conduit" or "Nonmetallic Underground Conduit with Conductors."

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PREFABRICATED ASSEMBLIES (QQRX)

This category covers prefabricated assemblies, which are factory-built assemblies incorporating pre-installed materials and equipment which, after installation, are usually concealed and may not be accessible for inspection at the installation site.

Materials, including the methods used for the installation of electrical, mechanical, heating and plumbing equipment incorporated in these assemblies by their manufacturer, have been judged under the requirements of UL, which are based on ANSI/NFPA 70, "National Electrical Code," and model fire, building, plumbing and mechanical codes.

Authorities Having Jurisdiction should be consulted before installation.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MANUFACTURED WIRING SYSTEMS (QQVX)

USE AND INSTALLATION

This category covers prefabricated wiring systems that may incorporate modular multipole connectors, AC cable, MC cable, flexible metal conduit, hard usage cord, outlet boxes, splitter assemblies, remote control switching assemblies and devices. The wiring systems cannot be field inspected by the Authority Having Jurisdiction (AHJ) without damage to the assembly.

Manufactured wiring systems suitable for patient care areas are intended for installation in accordance with Article 517 of ANSI/NFPA 70, "National Electrical Code" (NEC).

These prefabricated modules and assemblies are intended for installation rearrangement and inspection in accessible locations in accordance with Article 604 of the NEC. AHJs should be consulted before installation.

This equipment is intended to be connected to supply circuits of up to 600 V ac and maximum rating of 40 A per circuit.

Materials, including the methods used for the installation of electrical, mechanical and heating equipment incorporated in these assemblies by their manufacturer, have been investigated to requirements of UL, which are based on the NEC, ANSI/NFPA 72, "National Fire Alarm Code," and model building and mechanical codes.

PRODUCT MARKINGS

Each bi-directional wiring assembly is marked "WARNING: Risk of Fire or Electric Shock," and the following or equivalent: "Do not electrically con-

Manufactured Wiring Systems (QQVX)—Continued

nect to more than one source of supply. Always determine that the wiring assembly is electrically connected to one and only one source of supply.”
 Manufactured wiring systems suitable for installation in patient care areas are marked “Suitable For Patient Care Areas of Health Care Facilities Other Than Anesthetizing Locations.”
 Manufactured wiring systems suitable for installation in ducts or plenums are marked “Acceptable for Use in Ducts or Plenums Used for Environmental Air.”
 Manufactured wiring systems suitable for installation in air-handling spaces other than ducts or plenums are marked “Acceptable for Use in Air-handling Spaces Other Than Ducts or Plenums.”
 Assemblies of manufactured wiring systems suitable for use in outdoor locations are marked “Outdoor.”

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 183, “Manufactured Wiring Systems.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Distribution Box” or “Tap Box,” or other appropriate product name as shown in the individual Listings.

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SECTIONS AND UNITS (QQXX)

USE AND INSTALLATION

This category covers factory-built assemblies for use within, or as part of, the structure of buildings for commercial, industrial and residential use. These assemblies may incorporate pre-installed electrical power distribution systems comprised of certified electrical components, which are usually concealed and may not be accessible for inspection at the installation site. Some assemblies may incorporate additional certified equipment. Special occupancies as specified in ANSI/NFPA 70, “National Electrical Code,” are not covered under this category.

The structural requirements vary with the type of building construction, occupancy and location of installation and are not investigated under this category.

Authorities Having Jurisdiction should be consulted before installation.

PRODUCT MARKINGS

Some assemblies covered under this category have additionally been investigated to ANSI/UL 723, “Test for Surface Burning Characteristics of Building Materials,” and may be marked with a designation “FHC X/Y” on the assembly that denotes these products have a flame-spread value of “X” or less and a smoke-developed value of “Y” or less.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in ANSI/NFPA 70, “National Electrical Code.”

The basic standard used to investigate products in this category for flame-spread and smoke-developed values is ANSI/UL 723, “Test for Surface Burning Characteristics of Building Materials.” Such products are noted in the individual certifications.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Prefabricated *.”

* The appropriate product name as shown in the individual Listings

One Listing Mark is applied to each section or unit.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIRING ASSEMBLIES (QQYZ)

GENERAL

This category covers prefabricated wiring systems comprised of Listed electrical components that could be field assembled and inspected by an Authority Having Jurisdiction (AHJ), but are assembled in the factory prior to field installation.

Prefabricated wiring assemblies incorporate Listed conduit, tubing or cable, conductors and fittings intended for field installation in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC). They may be factory assembled to outlet or junction boxes, box-mounting brackets, and wiring devices.

Prefabricated wiring assemblies are marked with the conduit, tubing or cable type, and the conductor size and type to permit determination of their suitability for a specific application and ampacity in accordance with the NEC. A parts list is provided with each assembly to identify the extent of the product.

Materials, including the methods used for the installation of electrical, mechanical and heating equipment incorporated in these assemblies by their manufacturer, have been investigated to requirements of UL, which are based on the NEC, ANSI/NFPA 72, “National Fire Alarm Code,” and model building and mechanical codes.

Wiring Assembly Kits

Wiring assembly kits for final assembly in the field consist of a package that contains some or all: length(s) of Listed conduit, tubing or cable, Listed fittings appropriate for the type of conduit, tubing or cable, outlet or junction boxes, conductors, or other devices.

The packaging for wiring assembly kits is marked with the conduit, tubing, or cable size and type, and the conductor size and type, if provided, to permit determination of their suitability for a specific application and ampacity in accordance with the NEC. Installation instructions and a parts list are provided on or in each package. Acceptability of the field assembly is to be determined by the AHJ.

Conduit Kits

Conduit kits for final assembly in the field consist of a package that contains some or all: length(s) of Listed conduit or tubing, Listed fittings appropriate for the type of conduit or tubing, outlet or junction boxes, or other devices.

The packaging for conduit kits is marked with the conduit or tubing size and type to permit determination of their suitability for a specific application in accordance with the NEC. Installation instructions and a parts list are provided on or in each package. Acceptability of the field assembly is to be determined by the AHJ.

Surface Raceway Kits

Surface raceway kits for final assembly in the field consist of a package that contains some or all: length(s) of Listed surface metal or nonmetallic surface raceway, Listed fittings appropriate for the surface raceway, or other devices.

The packaging for surface raceway kits is marked with the raceway size and the number, type and size of conductors that may be installed in the Listed raceway, to permit determination of its suitability for a specific application in accordance with the NEC. Installation instructions and a parts list are provided on or in each package. Acceptability of the field assembly is to be determined by the AHJ.

RELATED PRODUCTS

For products covered by Article 604 of the NEC, see Manufactured Wiring Systems (QQVX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in ANSI/NFPA 70, “National Electrical Code.”

UL MARK

The Listing Mark of UL on the factory-assembled wiring assembly or the packaging of a wiring assembly kit is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Wiring Assembly,” “Wiring Assembly Kit,” “Conduit Kit” or “Surface Raceway Kit.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PREFABRICATED BUILDINGS (QRAR)

These are factory-built buildings, structures, and building assemblies incorporating pre-installed materials and equipment which, after installation, are usually concealed and may not be accessible for inspection at the installation site.

They are intended for installation subject to approval by the Authority Having Jurisdiction.

The buildings, structures, and building assemblies have been investigated in accordance with one or more Model Codes (such as Building, Fire, Plumbing, Mechanical, Gas, Energy) and the National Electrical Code and/or a State Code and/or an applicable Building Code of the local jurisdiction. As an alternate, the building, structure, and building assemblies have been investigated in accordance with one or more specific areas of a code such as electrical, plumbing, mechanical, structural, etc.

When the Building Code does not include specific requirements for such features as air cooling and heating systems, fuel supply systems, chimney and venting systems, etc., the applicable requirements of the National Fire Codes are used.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMPOSITE PANELS (QRSY) USE AND INSTALLATION

This category covers composite panels, which are factory-built panel assemblies intended for use within or as part of the structure of buildings for commercial, industrial and residential use. These assemblies incorporate pre-installed branch-circuit electrical power distribution systems that are usually concealed and may not be accessible for inspection at the installation site. Some panels incorporate audio, lighting, ventilation fans, and other certified utilization equipment.

The structural strength requirements vary with live loads, dead loads, and seismic conditions of each locality. Authorities Having Jurisdiction should be consulted with respect to their requirements for panel systems.

INSTALLATION INSTRUCTIONS

A copy of the installation and operation instructions are provided with each panel if shipped separately or with each set of panels intended to be installed as a system.

The composite panel system is provided with an assembly diagram and with an electrical diagram specifying the specific locations of the field-installed wiring connections, the connections between composite panel sections, factory-installed utilization equipment, and the intended field-wiring branch-circuit-conductor connection points of the panel system.

The installation instructions indicate which circuits are factory installed.

PRODUCT MARKINGS

Each input power feed conduit whip, cord or building field-wiring-connection point to the panel system is marked with a schematic wiring diagram or the equivalent, indicating the circuits and conductors provided and the required rating of the branch circuit to which it is to be connected.

A panel system with other than a single-phase circuit has the convenience receptacles and utilization equipment marked by a letter, number, color, or a similar designation to indicate the circuit in the system to which the receptacle or utilization equipment is connected.

Each panel system electrical accessory that is shipped separately from the major panel system to which it is to be connected is marked with respect to its intended use and interrelationship with the panel system; for example, "For Use with Composite Panel Series ____," in which the appropriate series or catalog number is designated. When separable components are factory assembled and shipped together, only the complete assembly and not the component is marked.

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1294, "Outline of Investigation for Composite Panels," and ANSI/NFPA 70, "National Electrical Code."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**COMPOSITE PANEL
AS TO ELECTRICAL FIRE AND SHOCK HAZARDS ONLY
Control No.**

or

Composite Panels (QRSY)—Continued

COMPOSITE PANEL ACCESSORY FOR USE WITH PANEL SERIES [panel designation] AS TO ELECTRICAL FIRE AND SHOCK HAZARDS ONLY Control No.

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COMMERCIAL AND INDUSTRIAL PREFABRICATED BUILDINGS AND UNITS (QRXA)

GENERAL

This category covers the installation of electrical systems in commercial or industrial prefabricated buildings and units, including, but not limited to, power-distribution buildings and units, refrigeration building and units, guard sheds, toll and phone booths, drive-up ATM booths, canopy shelters, traffic-control booths, indoor data/cash offices, power-wall modules, sound-isolation buildings, water-pump-station buildings, stationary ITE server or data-center buildings, storage buildings (for other than hazardous materials), and other similar buildings and units.

These factory-built buildings and units incorporate pre-installed materials and equipment which, after installation, may be concealed and may not be accessible for inspection at the final installation site. The final site installation of these prefabricated buildings and units is subject to approval by the Authority Having Jurisdiction.

These prefabricated buildings and units are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Each Subscriber must successfully complete an Initial Qualification Inspection for each manufacturing facility, demonstrating the capability to produce buildings or units conforming to UL program requirements. Each Subscriber's factory quality control system is audited on an annual basis. Each building or unit must be inspected during at least one stage of production for compliance with the applicable Articles of the NEC.

UL CERTIFICATE

The UL Certificate of Inspection is the only method provided by UL to identify prefabricated buildings and units inspected by UL under UL's Building Inspection Certificate Services Program.

The prefabricated buildings and units for which UL issues Certificates are considered by UL to comply with the applicable requirements of the NEC at the time of inspection. The Certificate is only valid when accompanied by a completed UL Inspection Report. The UL Inspection Report identifies applicable plan drawings that indicate all the equipment included in the building at the time of manufacturing. UL does not know what the effect of a modification to the electrical system or equipment, or to the construction of a prefabricated building or unit, subsequent to the inspection, may have on the safety of the product or the continued validity of the Certificate unless the modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to comply with the applicable requirements.

If the prefabricated building or unit is shipped in multiple sections or "knocked down," the number and description of the sections required to complete the building or unit are included on a building's nameplate. Instructions for completion of the building, including any wiring connections to be completed at the installation site, are also provided.

The Certificate is not transferable. UL reserves the right to void a Certificate at any time. The Certificate does not indicate compliance with any UL product certification program, nor does it entitle the Subscriber to use the UL Mark. UL assumes no liability for any loss that may result from failure of the equipment, incorrect certification, or nonconformity with requirements.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PRESS AND OTHER POWER-OPERATED MACHINE CONTROLS AND SYSTEMS (QUEQ)

This category covers controls and systems intended for industrial or commercial application on power-operated machines intended for such uses as pressing, punching, shearing or breaking operations. They may be designed for use on particular types of equipment such as pneumatic- or hydraulic-powered devices or mechanically operated part or full revolution types of machines. The control or system is intended to reduce the risk of bodily injury resulting from machine operation. The intended use of the control is noted in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PRESENCE-SENSING DEVICES (QUHP)

USE

This category covers presence-sensing devices intended for use in machine-control systems where they can be interconnected to the control system. Presence-sensing devices detect the presence of an object or body part and are used as a part of the machine safeguarding system to reduce the risk of bodily injury from moving machine parts.

Presence-sensing devices investigated for press initiation are noted in the individual Listings, and are intended to be in accordance with Section (11)(A) of 29CFR1910.217, "Mechanical Power Presses."

SPECIAL CONSIDERATIONS

These products are limited to use on part-revolution types of machines or machines where operation can be interrupted and motion stopped at any point in the machine operation cycle.

RELATED PRODUCTS

Presence-sensing devices employing active opto-electronic protective devices (AOPD) consisting of one or more light beams for the sensing function are covered under Active Opto-electronic Protective Devices (NIPF).

Presence-sensing devices employing active opto-electronic protective devices responsive to diffuse reflection (AOPDDR) consisting of one or more laser scanners for the sensing function are covered under Active Opto-electronic Protective Devices Responsive to Diffuse Reflection (NIPM).

ADDITIONAL INFORMATION

For additional information, see Press and Other Power-operated Machine Controls and Systems (QUEQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 508, "Industrial Control Equipment," and UL 991, "Tests for Safety-Related Controls Employing Solid-State Devices."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Presence Sensing Device."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PRESS CONTROLS (QUKQ)

USE

This category covers press controls intended for use in press control systems where they are interconnected with other components, such as push-button hand controls, valves, air cylinders, etc. When the press control or system is applied as intended, it is judged to be in accordance with Occupational Safety and Health Administration Standard Section 1910.217.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/NFPA 79, "Electrical Standard for Industrial Machinery," in addition to Article 670 of ANSI/NFPA 70, "National Electrical Code."

Press Controls (QUKQ)—Continued

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Press Control."

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PROCESS CONTROL EQUIPMENT, ELECTRICAL (QUYX)

GENERAL

This category covers process control equipment rated 600 V maximum and intended for use in accordance with ANSI/NFPA 70, "National Electrical Code." These products include instruments for measurement, recording and/or control of process variables (e.g., temperature, pressure, flow) and auxiliary devices used with these instruments (e.g., sensors, transducers, valve operators).

Equipment intended to be installed only in process control panels is so identified.

Process control equipment may be shipped completely assembled or in modular form. Modular assemblies are intended to be field assembled to form a complete system in accordance with the provided installation instructions.

Open-type process control equipment is not provided with a complete enclosure and is intended to be placed in an industrial control panel or similar type of enclosure.

The investigation of process control equipment does not include investigation of the function of the controlled equipment.

RELATED PRODUCTS

Process control equipment intended for mounting in hazardous (classified) locations or with circuits that extend into hazardous (classified) locations is covered under Process Control Equipment for Use in Hazardous Locations (QUZW) and Process Control Equipment for Use in Zone Classified Hazardous Locations (QVAJ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 61010-1, "Electrical Equipment for Measurement, Control, and Laboratory Equipment - Part 1: General Requirements."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Process Control Equipment," "Open-type Process Control Equipment," "Process Control Enclosure," "Process Control Enclosure Part," "Process Control Subassembly," "Process Control Accessory," or other appropriate product name as shown in the individual Listings. The words "Process Control Equipment" may be abbreviated "Proc. Cont. Eq." When the size or shape of a subassembly makes it impractical to incorporate the product identification text, the product may be marked with the UL symbol, "QUYX" and the control number, provided that the complete Listing Mark text appears on the smallest shipping container.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PROCESS CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (QUZW)

USE AND INSTALLATION

This category covers process control equipment rated 600 V maximum and intended for use in accordance with ANSI/NFPA 70, "National Elec-

PROCESS CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (QUZW)

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trical Code.” These products include instruments for measurement, recording and/or control of process variables (e.g., temperature, pressure, flow) and auxiliary devices used with these instruments (e.g., sensors, transducers, valve operators), including associated apparatus providing intrinsically safe outputs (e.g., barriers providing intrinsically safe circuit extensions).

Intrinsically safe systems have been investigated on the basis that all equipment connected to the system is certified as part of the system unless otherwise indicated and is used as intended.

Equipment intended to be installed only in process control panels is so identified in the individual certifications. Such equipment is not intended for field installation.

Safety may be affected if the manufacturer’s installation instructions are not followed.

The investigation of process control equipment does not include investigation of the function of the controlled equipment.

RELATED PRODUCTS

Equipment investigated for use only in the hazardous (classified) locations of automotive and marine service stations is covered under Control, Monitoring and Auxiliary Equipment (EQXX).

Process control equipment intended for use in unclassified locations is covered under Process Control Equipment, Electrical (QUYX).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 61010-1, “Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements.”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Process Control Equipment for Use in Hazardous Locations,” “Process Control System for Use in Hazardous Locations,” “Process Control Unit for Use in Hazardous Locations,” “Process Control Equipment (Associated Apparatus),” “Process Control Unit (Associated Apparatus),” or other appropriate product name as shown in the individual Listings. The words “Hazardous Locations” may be abbreviated “Haz. Loc.” The words “Process Control Equipment” may be abbreviated “Proc. Cont. Eq.”

When the size or shape of a subassembly makes it impractical to incorporate the product identification text, the product may be marked with the UL symbol, “QUZW” and the control number, provided that the complete Listing Mark text appears on the smallest shipping container.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PROCESS CONTROL EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (QVAJ)

USE AND INSTALLATION

This category covers process control equipment rated 600 V maximum and intended for use in accordance with ANSI/NFPA 70, “National Electrical Code.” These products include instruments for measurement, recording and/or control of process variables (e.g., temperature, pressure, flow) and auxiliary devices used with these instruments (e.g., sensors, transducers, valve operators).

Equipment intended to be installed only in process control panels is so identified in the individual certifications. Such equipment is not intended for field installation.

Intrinsically safe systems have been investigated on the basis that all equipment connected to the system is certified as part of the system, unless otherwise indicated, and is used as intended.

Safety may be affected if the manufacturer’s installation instructions are not followed.

The investigation of process control equipment does not include investigation of the function of the controlled equipment.

RELATED PRODUCTS

Equipment investigated for use only in hazardous (classified) locations of automotive and marine service stations is covered under Control, Monitoring and Auxiliary Equipment (EQXX).

PROCESS CONTROL EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (QVAJ)

Process control equipment intended for use in unclassified locations is covered under Process Control Equipment, Electrical (QUYX).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 61010-1, “Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements.”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Process Control Equipment for Use in Hazardous Locations,” “Process Control System for Use in Hazardous Locations,” “Process Control Unit for Use in Hazardous Locations,” “Process Control Equipment (Associated Apparatus),” “Process Control Unit (Associated Apparatus),” or other appropriate product name as shown in the individual Listings. The words “Hazardous Locations” may be abbreviated “Haz. Loc.” The words “Process Control Equipment” may be abbreviated “Proc. Cont. Eq.”

When the size or shape of a subassembly makes it impractical to incorporate the product identification text, the product may be marked with the UL symbol, “QVAJ” and the control number, provided that the complete Listing Mark text appears on the smallest shipping container.

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PROTECTORS (QV GK)

This category covers devices intended for use with telephone, telegraph, fire alarm (other than municipal circuits) and similar signaling circuits to discharge high potential currents to ground. These protectors are divided into four separate categories:

- Primary Protectors for Communication Circuits (QVGV)
- Primary Protectors for Coaxial Communications Circuits (QVKG)
- Protectors for Antenna Lead-in Conductors (QVLA)
- Secondary Protectors for Communication Circuits (QVRG)
- Isolated Loop Circuit Protectors for Communication Circuits (QV GQ)

The primary protectors are intended to be installed, used and maintained by operating communications companies that own the outside plant facilities that provide service to the subscriber premise. They are intended for installation as defined in Article 800 of ANSI/NFPA 70, “National Electrical Code” (NEC). A primary protector may be housed in its own enclosure or secured within a Listed compatible network interface box.

Primary coaxial protectors are intended for use on coaxial communications circuits and network-powered broadband communications systems as defined in Article 830 of the NEC. The protectors are typically installed by the public utility company that provides the service and are installed at the point of entry where the coaxial circuit enters the subscriber premises. The protector may be housed in its own enclosure or secured within a Listed compatible network interface box.

Protectors for antenna lead-in conductors are used to limit surges on the antenna lead-in cable that connects the antenna to the receiver/transmitter electronics. Typical applications include antenna installations for radio and television receiving equipment, amateur radio transmitting and receiving equipment, cellular telephone towers and WiMax or WiFi wireless networks.

A secondary protector may be installed, used and maintained by the customer, interconnecting company, or the operating company. A secondary protector must employ an overcurrent protection system, such as a line fuse.

The purpose of the isolated loop circuit protector is to suppress abnormal voltages caused by hazards such as lightning and other EMI transients. An isolated loop circuit protector is intended for use on data or communication lines that are not exposed to accidental contact with electric light or power conductors operating at over 300 V to ground.

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PRIMARY PROTECTORS FOR COMMUNICATIONS CIRCUITS (QVGV)

GENERAL

This category covers protectors intended for use on communication circuits as defined in Article 800 of ANSI/NFPA 70, "National Electrical Code" (NEC).

These protectors are intended to suppress abnormal voltage conditions that may exist on the circuit due to accidental contact with electric light or power conductors operating at or over 300 V to ground as defined in the NEC. These devices may also be used to protect against electrical transients from an electromagnetic disturbance or higher than normal voltages induced on the communication circuits due to close proximity of the protected circuit to electric light or power conductors.

This category includes both fuse and fuseless protectors. Requirements for the location and installation of primary protectors are contained in the NEC. The individual Listings provide the following information: Protector block number, catalog numbers of arresters that may be employed in a Listed block, types of arresters, design features, maximum fusing wire that is used in series with the block, and indoor or outdoor use.

The maximum size fusing wire is indicated by the following alphabetical designations:

- A – 24 AWG, copper wire with thermoplastic insulation
- B – 22 AWG, copper wire with thermoplastic insulation
- C – 20 AWG, 40% copper-clad wire
- D – 26 AWG, copper wire with thermoplastic insulation

Protector blocks suitable for outdoor use are also suitable for use indoors. Blocks marked for indoor use are suitable for installation only indoors.

This category also covers network interface devices, which are two-compartment enclosures that serve to provide a demarcation between the equipment of the private residence and the outside plant. The first compartment, located on the incoming side of the telephone line, may employ a Listed compatible telephone protector, where the compatibility is determined by UL. The second compartment employs terminals and standard telephone jacks for use by the resident. Indoor and outdoor Listing is subject to the same requirements used in the investigation of telephone protectors.

RELATED PRODUCTS

Separate network interface devices intended for use without a protector are covered under Communication Circuit Accessories (DUXR).

Protectors intended for use with municipal fire alarm circuits are covered under Miscellaneous Devices (UXKV).

Secondary protectors intended for telephone, telegraph, fire alarm and similar signaling circuits are covered under Secondary Protectors for Communications Circuits (QVRG).

ADDITIONAL INFORMATION

For additional information, see Protectors (QV GK) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 497, "Protectors for Paired-Conductor Communications Circuits."

Protectors that have been subjected to an 8/20, 10 kA surge have additionally been investigated to ANSI/NFPA 780, "Standard for the Installation of Lightning Protection Systems" (2004).

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Signal Circuit Protector," "Telephone Protector," "Network Interface Device" or "Signal Circuit Protector Enclosure."

The product name for protectors that comply with the 8/20, 10 kA surge test as required by ANSI/NFPA 780 includes "10 kA."

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PRIMARY PROTECTORS FOR COAXIAL COMMUNICATIONS CIRCUITS (QVKC)

GENERAL

This category covers primary coaxial protectors intended for use on coaxial communication circuits and network-powered broadband communications systems as defined in Article 830 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Primary Protectors for Coaxial Communications Circuits (QVKC)—Continued

The protectors are typically installed by the public utility company that provides the service and are installed at the point of entry where the coaxial circuit enters the subscriber premises.

The primary coaxial protectors are intended to suppress abnormal voltage conditions that may exist on the circuit due to accidental contact with electric light or power conductors operating at over 300 V to ground as defined in Articles 800 and 830 of the NEC. These protectors may also be used to protect against electrical transients produced from electromagnetic disturbance on the communication circuits.

The primary coaxial protectors may also be used in low- and medium-network-powered sources as defined in the Limitations for Network-Powered Broadband Communications Systems Table of Article 830 of the NEC. The protectors are certified for use with a current-limiting or extinguishing device, or current-limiting or extinguishing component specified in the individual certifications and installation instructions. The current-limiting or extinguishing device, or current-limiting or extinguishing component may be employed within the protector or may be a separate device or component coordinated externally with the protector.

Coaxial protectors may be used indoors or outdoors. Coaxial protectors marked for outdoor use are also suitable for use indoors. Protectors marked for indoor use are intended for indoor installation only. The coaxial protectors may be installed within a certified enclosure or network interface device or may be installed as a stand-alone device.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 497C, "Protectors for Coaxial Communications Circuits."

Protectors that have been subjected to an 8/20, 10 kA surge have additionally been investigated to ANSI/NFPA 780 (2004), "Standard for the Installation of Lightning Protection Systems."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Primary Coaxial Protector."

The product name for protectors that comply with the 8/20, 10 kA surge test as required by ANSI/NFPA 780 includes "10 kA."

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SECONDARY PROTECTORS FOR COMMUNICATIONS CIRCUITS (QVRG)

GENERAL

This category covers secondary protectors intended for use on communication circuits as defined in Article 800 of ANSI/NFPA 70, "National Electrical Code" (NEC).

These protectors are intended to suppress abnormal voltage and/or current conditions that bypass the primary protector. These devices limit currents to less than the current-carrying capacity of Listed communication wire employed in the communication loop of the protected premise. Any overvoltage protection and/or grounding connection is intended to be electrically located on the equipment side of the protector's current-limiting means.

Secondary protectors covered in this category have been investigated for use only on the equipment side of a primary protector (QVGV) and are intended to be installed only on the protected portion of a communication circuit. In those cases where a primary protector is not required, as defined in Article 800 of the NEC, the secondary protector may be installed or connected into the communication circuit without the use of a primary protector.

The current-limiting, fusing or extinguishing operation may be accomplished by a current-protection device located within the secondary protector, or the secondary protector may be used with a "sneak current protector." A sneak current protector serves to limit abnormal fault current that is generated due to contact of the telephone lines with AC power lines. The sneak current protector is a separate device or module that is intended for mounting on a Listed compatible base assembly. This current-protection system may employ a fuse, current-limiting circuitry or other similar means to limit the abnormal fault current condition.

RELATED PRODUCTS

Secondary Protectors for Communications Circuits (QVRG)—Continued

Primary telephone protectors are covered under Primary Protectors for Communication Circuits (QVGV).

Other telephone equipment is covered under Telephone Appliances and Equipment (WYQQ).

Wire and cable intended to be permanently installed in a building in accordance with Article 800 of the NEC are covered under the appropriate wire and cable categories.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 497A, "Secondary Protectors for Communications Circuits."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Secondary Protector," "Secondary Telephone Protector" or "Sneak Current Protector."

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PROTECTORS FOR USE IN HAZARDOUS LOCATIONS (QVSC) ISOLATED LOOP CIRCUIT PROTECTORS FOR USE IN HAZARDOUS LOCATIONS (QVSI)

USE

This category covers protectors intended for use on Class 2 or Class 3 remote control, signaling and power-limited circuits or fire-protection-signaling circuits as defined in Articles 725 and 760 of ANSI/NFPA 70, "National Electrical Code."

These protectors are intended as suppression devices for abnormal voltage conditions that may exist on the circuit due to electrical transients from an electromagnetic disturbance. These protectors are not intended for use on circuits exposed to accidental contact with electric light or power conductors operating at over 300 V to ground.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 497B, "Protectors for Data Communications and Fire-Alarm Circuits."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Isolated Loop Circuit Protector for Use in Hazardous Locations."

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PUMPING EQUIPMENT FOR FIRE SERVICE (QVUT)

The following information and listings relate to fire pumps, drivers, controllers and accessory equipment used in supplying water for fire protection purposes.

A fire pump unit generally includes the separately Listed fire pump, driver, controller, and other accessory equipment. The individually Listed products are intended to be installed and tested for acceptable performance in accordance with the requirements of the Standard of the National Fire Protection Association for the Installation of Centrifugal Fire Pumps, NFPA 20.

Authorities having jurisdiction should be consulted before installation.

BATTERY CHARGERS FOR USE WITH INTERNAL COMBUSTION ENGINES DRIVING CENTRIFUGAL FIRE PUMPS (QWIR)

GENERAL

This category covers battery chargers intended for automatically controlling and maintaining the charge on batteries used to start internal-combustion engines driving centrifugal fire pumps. The equipment consists of rectifying stacks, transformers, controlling relays, switches and meters.

ADDITIONAL INFORMATION

For additional information, see Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1236, "Battery Chargers for Charging Engine-Starter Batteries."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Battery Charger for Use with Fire Pumps."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FIRE PUMP MOTORS (QXZF)

USE

This category covers motors intended for use in fire pump systems. These motors are used to drive centrifugal pumps used for fire service.

PRODUCT MARKINGS

This equipment is marked as follows:

1. Manufacturer's name or trademark
2. Factory identifier (if produced at more than one factory)
3. Model or catalog number
4. Rated voltage
5. Full-load input amperes or watts (or both)
6. Rated full-load speed
7. Rated temperature rise or the insulation system class
8. Rated ambient temperature
9. Time rating, or, if it is a continuous duty motor, then "Continuous" or "CONT"
10. Rated horsepower when 1/8 hp (93 W) or more
11. Code letter to indicate locked-rotor amperes in accordance with ANSI/NFPA 70, "National Electrical Code," for an alternating-current motor rated 1/2 hp (373 W output) or more
12. Secondary volts and full-load amperes, when product is a wound-rotor induction motor
13. Rated frequency expressed in one of the following terms: hertz (Hz), cycles per second (cps or c/s), ac-dc, (number of cycles)/dc (e.g., 60/dc), or ac only – or direct current; and, for a motor intended for use on a polyphase circuit, number of phases
14. Winding – straight shunt, stabilized shunt, compound, or series, for a direct-current motor;
15. Service factor (1.15 or less)
16. Amperes and horsepower at each speed, for a multi-speed motor other than a shaded-pole or a permanent-split-capacitor motor

ADDITIONAL INFORMATION

For additional information, see Pumping Equipment for Fire Service (QVUT) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1004-5, "Fire Pump Motors."

Where indicated in the individual certifications, the spacings provided within these motors have additionally been investigated to ANSI/UL 840, "Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fire Pump Motor."

Fire Pump Motors (QXZF)—Continued

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PUMP CONTROLLERS, FIRE (QYZS)

GENERAL

This category covers fire pump controllers, circuit breakers for fire pump controllers, emergency manual operators and remote alarm panels.

Fire pump controllers are intended for starting and stopping centrifugal fire pumps and include nonautomatic and automatic types for electric-driven pumps and combined manual and automatic types for engine-driven pumps. Unless otherwise indicated in the individual certifications, these controllers are intended for use with spark-ignition (gasoline or natural gas) or diesel engines. Controllers suitable for use with spark-ignition internal combustion engines are intended for such engines installed prior to 1974.

These controllers are intended for installation and use in accordance with ANSI/NFPA 20, "Installation of Stationary Pumps for Fire Protection."

Fire pump controllers intended for starting and stopping additive pump motors are marked "Additive Pump Controller" or "Limited-service Additive Pump Controller."

Controllers intended for electric-driven, standard-size centrifugal fire pumps are intended for use with squirrel-cage or wound-rotor motors rated 600 V or less.

Controllers intended for squirrel-cage motors may be for across-the-line starting or reduced-voltage starting as indicated in the individual certifications.

"Limited-service controllers" are intended for across-the-line type squirrel-cage motors of 30 hp or less, 600 V or less. Authorities Having Jurisdiction should be consulted before installing controllers of these types.

Manually operable, open-type circuit breakers are intended for use within enclosures of fire pump controllers.

Emergency manual operators are intended for use with internal combustion engines.

Some controllers are suitable for use as service equipment and are so marked. Such marking is an integral part of other required markings.

ADDITIONAL INFORMATION

For additional information, see Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 508, "Industrial Control Equipment," and ANSI/UL 218, "Fire Pump Controllers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Fire Pump Controller," "Limited Service Controller," "Additive Pump Controller," "Limited Service Additive Pump Controller."

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PUMP CONTROLLERS, FIRE, OVER 600 VOLTS (QZGR)

GENERAL

This category covers fire pump controllers having ac voltage ratings in the range of 2.2 kV to 2.5 kV, 4.0 kV to 5.0 kV or 6.2 kV to 7.2 kV, intended for starting and stopping centrifugal fire pumps. These controllers are the automatic or nonautomatic type for electric-driven pumps.

These controllers are intended for installation and use in accordance with ANSI/NFPA 20, "Installation of Stationary Pumps for Fire Protection."

These fire pump controllers are intended for use with squirrel-cage motors rated 7.2 kV or less.

These controllers have been investigated for use on three-phase circuits having available fault levels not exceeding the MVA rating appearing on the nameplate. The three-phase available symmetrical MVA is equal to the product of the available symmetrical rms short-circuit current, the line-to-line open-circuit voltage, and a phase factor of 1.73 x 10⁶.

Pump Controllers, Fire, Over 600 Volts (QZGR)—Continued

These controllers are intended for across-the-line starting and for making and breaking the circuit when the motor is stalled; accordingly, they are tested at six times the continuous current rating of the controller at rated voltage.

Some fire pump controllers are provided with an integrally mounted surge arrester to meet the required impulse withstand.

Controllers suitable for use as service equipment are so marked. Such marking is an integral part of other required markings.

These controllers are so constructed that falling dirt or water dripping from the downward vertical does not interfere with the successful operation of the equipment.

Fire pump controllers are substantially complete when shipped from the factory and final acceptability for service does not depend upon assembly of parts in the field.

ADDITIONAL INFORMATION

For additional information, see Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 218, "Fire Pump Controllers," ANSI/UL 347, "High Voltage Industrial Control Equipment," and ANSI/NFPA 20, "Installation of Stationary Pumps for Fire Protection."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "High Voltage Fire Pump Controller" or "High Voltage Foam Pump Controller."

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PUMP CONTROLLERS, FIRE, RESIDENTIAL (QZKE)

GENERAL

This category covers fire pump controllers intended for starting, stopping and protecting centrifugal fire pumps in one- and two-family dwellings and manufactured homes. These controllers are the automatic or non-automatic type for electric-driven pumps.

The equipment and systems employing these controllers are intended for installation and use in accordance with ANSI/NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes."

Residential fire pump controllers are intended for use with squirrel-cage motors rated 250 V or less.

These controllers have been investigated for use on single-phase alternating-current circuits having available fault current levels not exceeding the short-circuit withstand rating appearing on the nameplate.

These controllers are intended for across-the-line starting and for making and breaking the circuit when the motor is stalled; accordingly, they are tested at six times the continuous current rating of the controller at rated voltage.

Controllers suitable for use as service equipment are so marked. Such marking is an integral part of other required markings.

These controllers are so constructed that falling dirt or water dripping from the downward vertical does not interfere with the successful operation of the equipment.

Residential pump controllers are substantially complete when shipped from the factory and final acceptability for service does not depend upon assembly of parts in the field.

ADDITIONAL INFORMATION

For additional information, see Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 218, "Fire Pump Controllers," ANSI/UL 508, "Industrial Control Equipment," and ANSI/NFPA 20, "Installation of Stationary Pumps for Fire Protection," as applicable to limited-service fire pump controllers.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Residential Fire Pump Controller."

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PRODUCT CATEGORIES BY CATEGORY CODE

Pump Controllers, Fire, Residential (QZKE)—Continued

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PUMPING EQUIPMENT FOR FIRE SERVICE FOR USE IN HAZARDOUS LOCATIONS (RAHW)

This category covers fire pumps, drivers, controllers and accessory equipment used in supplying water for fire protection purposes.

A fire pump unit generally includes the separately Listed fire pump, driver, controller, and other accessory equipment. The individually Listed products are intended to be installed and tested for acceptable performance in accordance with ANSI/NFPA 20, "Standard for the Installation of Stationary Pumps for Fire Protection."

FIRE PUMP CONTROLLERS FOR USE IN HAZARDOUS LOCATIONS (RCYW)

USE

This category covers fire pump controllers, circuit breakers for fire pump controllers, and emergency manual operators.

Fire pump controllers are intended for starting and stopping centrifugal fire pumps and include nonautomatic types and automatic types for electric-driven pumps and combined manual and automatic types for engine-driven pumps. Unless otherwise indicated, these controllers are intended for use with spark ignition (gasoline or natural gas) or diesel engines. Controllers suitable for use with spark ignition internal combustion engines are intended for such engines installed prior to 1974.

Controllers for electric-driven, standard-size centrifugal fire pumps are intended for use with squirrel-cage or wound-rotor motors rated 600 V or less.

Controllers for squirrel-cage motors may be used for across-the-line starting or reduced-voltage starting as indicated in the individual certifications.

Limited-service controllers are intended for across-the-line type squirrel-cage motors of 30 hp or less, 600 V or less. Authorities Having Jurisdiction should be consulted before installing controllers of these types.

Manually operable, open-type circuit breakers are intended for use within enclosures of fire pump controllers.

Emergency manual operators are intended for use with internal combustion engines.

Some controllers are suitable for use as service equipment and are so marked. Such marking is an integral part of other required marking.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standards used to investigate products in this category are ANSI/UL 508, "Industrial Control Equipment," and ANSI/UL 218, "Fire Pump Controllers."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Fire Pump Controller for Use in Hazardous Locations," "Limited Service Controller for Use in Hazardous Locations," "Foam Pump Controller for Use in Hazardous Locations," "Limited Service Foam Pump Controller for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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PUMPS, ELECTRICALLY OPERATED, LIQUID (REUZ)

USE

This category covers submersible and nonsubmersible pumps intended for household, commercial or industrial use, including pumps for fountains, circulation, sewage, effluent, wells, irrigation, building sites (contractor type), sumps and general utility.

The liquids for which a pump has been investigated are marked on the unit or are included in the installation instructions provided with the unit, unless the pump is obviously intended for use with water only, such as an irrigation pump.

Pumps suitable for outdoor use and those for use with heated water are so marked.

REBUILT PRODUCTS

This category also covers submersible and nonsubmersible pumps that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt submersible and nonsubmersible pumps are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt submersible and nonsubmersible pumps are subject to the same requirements as new submersible and nonsubmersible pumps.

RELATED PRODUCTS

Equipment covered under this category has not been investigated for use in hazardous (classified) locations as defined in ANSI/NFPA 70, "National Electrical Code." Reference to the Hazardous Locations Equipment Directory should be made for equipment that has been investigated for use in hazardous (classified) locations.

The products covered in this category have not been investigated with regard to the effect of their use with combustible or flammable liquids, corrosive liquids, or aqueous solutions containing corrosive materials. Such pumps are covered under Flammable Liquid Pumps (RBQR) and Power-operated Pumps (RBOG).

These pumps have not been investigated for use with or in proximity to swimming pools or spas. Such pumps are covered under Swimming Pool and Spa Equipment, Pumps (WCSX).

Pumping equipment for fire service is covered under Pumping Equipment for Fire Service (QVUT).

Pumps covered in this category have not been investigated for contact with drinking water. Pumps that have been investigated only for contact with drinking water are Classified in accordance with the requirements of ANSI/NSF 61, "Drinking Water System Components - Health Effects" and are covered under Drinking Water System Components (FDNP).

For evaporative cooler pumps, see Evaporative Cooler Retrofit Pumps (AGIS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 778, "Motor-Operated Water Pumps."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Sump Pump," "Water Circulating Pump" or "Sewage Pump," or other appropriate product name as shown in the individual Listings.

For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

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PURGING AND PRESSURIZING CONTROLS AND ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (RFPW)

GENERAL

This category covers purging and pressurizing controls and accessory parts intended to be connected to electrical equipment enclosures that are to be purged and pressurized with clean air or nonflammable gas in accordance with ANSI/NFPA 496, "Purged and Pressurized Enclosures for Electrical Equipment." This category does not cover the purged or pressurized electrical equipment. Purged or pressurized electrical equipment is covered under the individual product category for the particular type of equipment.

TYPES

ANSI/NFPA 496 specifies the following pressurization types:

PURGING AND PRESSURIZING CONTROLS AND ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (RFPW)

- Type X** — Reduces the classification within an enclosure from Division 1 to unclassified
- Type Y** — Reduces the classification within an enclosure from Division 1 to Division 2
- Type Z** — Reduces the classification within an enclosure from Division 2 to unclassified

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY*] FOR USE IN HAZARDOUS LOCATIONS IN ACCORDANCE WITH THE NATIONAL FIRE PROTECTION ASSOCIATION STANDARD FOR PURGED AND PRESSURIZED ENCLOSURES FOR ELECTRICAL EQUIPMENT NFPA 496

* **PURGE CONTROL** or **PURGE CONTROL ACCESSORY**, or other appropriate product name as shown in the individual Classifications

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PURGING AND PRESSURIZING CONTROLS AND ACCESSORIES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (RFPZ)

GENERAL

This category covers purging and pressurizing controls and accessory parts intended to be connected to electrical equipment enclosures that are to be purged and pressurized with clean air or nonflammable gas.

There are three pressurization types:

- px** — Reduces the classification within an enclosure from Zone 1 to unclassified
- py** — Reduces the classification within an enclosure from Zone 1 to Zone 2
- pz** — Reduces the classification within an enclosure from Zone 2 to unclassified

This category does not cover the purged or pressurized electrical equipment. Purged or pressurized electrical equipment is covered under the individual product category for the particular type of equipment.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic hazardous (classified) locations standard used to investigate products in this category is ANSI/ISA-60079-2, "Electrical Apparatus for Explosive Gas Atmospheres - Part 2: Pressurized Enclosures 'p'."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY*] FOR USE IN HAZARDOUS LOCATIONS IN ACCORDANCE WITH ANSI/ISA-60079-2 ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES - PART 2: PRESSURIZED ENCLOSURES 'p' Control No.

* **PURGE CONTROL** or **PURGE CONTROL ACCESSORY**, or other appropriate product name as shown in the individual Classifications.

PURGING AND PRESSURIZING CONTROLS AND ACCESSORIES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (RFPZ)

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRICAL QUICK-CONNECT TERMINALS (RFVW)

GENERAL

This category covers quick-connect tabs and quick-connect connectors constructed from plain or plated copper alloy or of nickel or nickel alloy, herein referred to as quick-connect terminals. They are additionally defined as follows:

Quick-connect Wiring Termination — An electrical connection consisting of a male tab and a female connector that can be readily engaged or disengaged without the use of a tool.

Terminal — An electrical connecting device consisting of either a connector or tab.

Tab — A terminal that is inserted in a connector, manufactured to specified tolerances, and intended to mate with a connector to establish a connection in an electrical circuit.

Connector — A terminal that is pushed onto a tab. Quick-connect terminals are intended for use with one or two copper conductors, 22-10 AWG. Ampacity for a two-wire combination is limited to the current associated with the largest of the two conductors.

Quick-connect terminals are not intended for disconnecting under load.

PRODUCT MARKINGS

Cartons containing quick-connect terminals are marked to indicate whether the tab or connector is suitable for the internal wiring of appliances, for field termination of conductors to electrical equipment, or for both.

Cartons containing quick-connect terminals are marked to indicate their suitability for termination of copper wire only.

Cartons containing insulated quick-connect terminals are marked with a voltage rating and the maximum operating temperature for which they have been found acceptable. The marked voltage rating may be 300 V maximum; 600 V maximum; or 600 V maximum building wire, 1000 V maximum signs or luminaires. An insulated terminal is additionally marked with the maximum operating temperature.

Quick-connect terminals to be assembled to wire using a special tool are intended to be assembled using the tool specified by the manufacturer or in the shipping carton. Such tools are identified by an appropriate marking.

RELATED PRODUCTS

Quick-connect tabs or connectors constructed from plated steel, or unplated steel of a corrosion-resistant alloy are covered under Electrical Quick-connect Terminals (RFVW2).

The separate molded insulating portion of a quick-connect terminal that is applied after its assembly to the conductor is covered under Connector Housings (ECCT2). Integral insulators to the quick-connect terminal are covered under this category as part of the quick-connect terminal.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 310, "Electrical Quick-Connect Terminals."

UL MARK

The Listing Mark of UL on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Quick-connect Tab" or "Quick-connect Connector," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RACEWAY (RGKT)

CELLULAR CONCRETE FLOOR RACEWAY (RGYR)

USE AND INSTALLATION

This category covers cellular concrete floor raceway designed for the installation of electrical conductors in accordance with Article 372 of ANSI/NFPA 70, "National Electrical Code." This raceway is intended for installation and use in accordance with the following information.

Certified cellular concrete floor raceway has fire-resistance ratings, as used in building construction, only when assembled in the manner described in the designs covered under Precast Concrete Units (CFTV). Where header ducts and junction boxes are involved, these items must be shown in the design drawing in order that the associated fire-resistance rating can be considered appropriate.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector and others concerned with the installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 263, "Fire Tests of Building Construction and Materials."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cellular Concrete Floor Raceway."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Cellular Concrete Floor Raceway Fittings (RHLZ)

USE AND INSTALLATION

This category covers cellular concrete floor raceway fittings designed for the installation of electrical conductors in accordance with the manufacturer's installation instructions. These fittings are also intended for installation and use in accordance with the following information and the limitations specified in Cellular Concrete Floor Raceway (RGYR).

Certified cellular concrete floor raceway fittings have fire-resistance ratings, as used in building construction, only when assembled in the manner described in the designs covered under Precast Concrete Units (CFTV). Where fittings are involved, these items must be shown in the design drawing in order that the associated fire-resistance rating can be considered appropriate.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector and others concerned with the installation.

ADDITIONAL INFORMATION

For additional information, see Cellular Concrete Floor Raceway (RGYR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 263, "Fire Tests of Building Construction and Materials."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cellular Concrete Floor Raceway Fitting," "End Closure" or "Wall Elbow," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CELLULAR METAL FLOOR RACEWAY (RHZX)

USE AND INSTALLATION

This category covers cellular metal floor raceway designed for the installation of electrical conductors in accordance with Article 374 of ANSI/NFPA 70, "National Electrical Code." This raceway is intended for installation and use in accordance with the following information.

Raceway may be factory constructed or consist of field-assembled components. Each component of field-assembled raceway is marked to identify its relation to the other components of the raceway.

Certified cellular metal floor raceway has fire-resistance ratings, as used in building construction, only when assembled in the manner described in the Designs covered under Steel Floor and Form Units (CHWX). Where header ducts and junction boxes are involved, these items must be shown in the Design drawing in order that the associated fire-resistance rating can be considered appropriate.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector, and others concerned with the installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 209, "Cellular Metal Floor Raceways and Fittings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cellular Metal Floor Raceway," "Cellular Metal Floor Raceway Bottom" or "Cellular Metal Floor Raceway Cover Plate for Use with Listed Raceway Bottom," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Cellular Metal Floor Raceway Fittings (RINV)

USE AND INSTALLATION

This category covers cellular metal floor raceway fittings designed for the installation of electrical conductors in accordance with the manufacturer's installation instructions. These fittings are also intended for installation and use in accordance with the following information and the limitations specified in Cellular Metal Floor Raceway (RHZX).

Raceway fittings may be factory constructed or consist of field-assembled components. Each component of a field-assembled raceway is marked to identify its relation to the other components of the raceway.

Certified cellular metal floor raceway fittings have fire-resistance ratings, as used in building construction, only when assembled in the manner described in the designs covered under Steel Floor and Form Units (CHWX). Where fittings are involved, these items must be shown in the design drawing in order that the associated fire-resistance rating can be considered appropriate.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector, and others concerned with the installation.

ADDITIONAL INFORMATION

For additional information, see Cellular Metal Floor Raceway (RHZX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 209, "Cellular Metal Floor Electrical Raceways and Fittings".

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cellular Metal Floor Raceway Fitting," "End Closure" or "Grommet," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Cellular Metal Floor Raceway Fitting Cover Assemblies Classified for Use with Specified Equipment (RIOJ)

USE AND INSTALLATION

This category covers Listed cellular metal floor raceway fitting cover assemblies Classified for use with specified Listed cellular metal floor raceway fittings (see RINV), and Listed cellular metal floor raceway fittings Classified for use with specified Listed cellular metal floor raceway fitting cover assemblies, in accordance with the details described in the Classification Mark.

Cellular metal floor raceway fitting cover assemblies may be factory constructed or consist of field-assembled components. Each component of a field-assembled raceway cover assembly is marked to identify its relation to the other components of the raceway.

Listed cellular metal floor raceway fittings have fire-resistance ratings, as used in building construction, only when assembled in the manner described in the designs covered under Steel Floor and Form Units (CHWX). Where fittings are involved, these items must be shown in the design drawing in order that the associated fire-resistance rating can be considered appropriate.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector, and others concerned with the installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 209, "Cellular Metal Floor Raceway and Fittings."

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Classification Mark for these products includes the complete Listing Mark for Cellular Metal Floor Raceway Fittings (RINV) and the following additional information:

**ALSO CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
FOR USE WITH UL LISTED *
CATALOG NO. _____
[LISTEE'S NAME]**

*** CELLULAR METAL FLOOR RACEWAY FITTINGS or CELLULAR METAL FLOOR RACEWAY FITTING COVER ASSEMBLIES**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

STRUT-TYPE CHANNEL RACEWAY (RIUU)

USE

This category covers strut-type channel raceway for installation in dry locations only in accordance with Article 384 of ANSI/NFPA 70, "National Electrical Code." This raceway is intended for installation and use in accordance with the following information.

PRODUCT MARKINGS

The number, type and size of conductors which may be installed in the certified raceway is marked on the raceway, on the installation instruction sheet or on the package in which it is shipped.

Raceway for use with lighting fixtures and/or other devices is marked to this effect on the raceway or on the package in which it is shipped.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 5B, "Strut-Type Channel Raceways and Fittings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Strut-Type Channel Raceway," "Strut-Type Channel Raceway Base" or "Strut-Type Channel Raceway Closure Strip."

The Listing Mark is applied to each length or package of complete raceway, raceway closure strip (cover) or raceway base.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Strut-type Channel Raceway (RIUU)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Strut-type Channel Raceway Fittings (RIYG)

USE

This category covers fittings, such as adapters, boxes, elbows and tees, intended for use with the same manufacturer's strut-type channel raceway. These fittings are intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code," and the manufacturer's installation instructions. These fittings are also intended for installation and use in accordance with the following information and the limitations specified in Strut-type Channel Raceway (RIUU).

PRODUCT MARKINGS

A fitting for supporting a fixture is marked "Suitable for a fixture not exceeding ____ kg (lb)." The specified fixture weight should not exceed 22.7 kg (50 lb). The marking is readily visible after the fitting has been mounted.

ADDITIONAL INFORMATION

For additional information, see Strut-type Channel Raceway (RIYG) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 5B, "Strut-Type Channel Raceways and Fittings."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Strut-Type Channel Raceway Fitting," "Elbow" or "Tee," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SURFACE METAL RACEWAY (RJBT)

USE

This category covers surface metal raceway intended for installation in accordance with Article 386 of ANSI/NFPA 70, "National Electrical Code" (NEC). This raceway is intended for installation and use in accordance with the following information.

GROUNDING

Surface metal raceway is considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with the NEC.

PRODUCT MARKINGS

The number, type and size of conductors which may be installed in the certified raceway is marked on the raceway, on the installation instruction sheet or on the package in which it is shipped.

Raceway for use with lighting fixtures and/or other devices is marked to this effect on the raceway or on the package in which it is shipped.

RELATED PRODUCTS

Some luminaires covered under Fluorescent Surface-mounted Luminaires (IEUZ) are suitable for use as raceways.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 5, "Surface Metal Raceways and Fittings."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Surface Metal Raceway," "Surface Metal Raceway Base for Use with Labeled Raceway Cover" or "Surface Metal Raceway Cover for Use with Labeled Raceway Base."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

PRODUCT CATEGORIES BY CATEGORY CODE

Surface Metal Raceway (RJBT)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Surface Metal Raceway Fittings (RJPR)

USE

This category covers surface metal raceway fittings intended for installation in accordance with the manufacturer's installation instructions. These fittings are also intended for installation and use in accordance with the following information and the limitations specified in Surface Metal Raceway (RJBT).

GROUNDING

Surface metal raceway fittings are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

A fitting for supporting a fixture is marked "Suitable for a fixture not exceeding ____ kg (lb)." The specified fixture weight should not exceed 22.7 kg (50 lb). The marking is readily visible after the fitting has been mounted.

ADDITIONAL INFORMATION

For additional information, see Surface Metal Raceway (RJBT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 5, "Surface Metal Raceways and Fittings."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Surface Metal Raceways Fitting," "Hanger" or "Side Feed," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SURFACE NONMETALLIC RACEWAY (RJTX)

USE

This category covers surface nonmetallic raceway intended for installation in accordance with Article 388 of ANSI/NFPA 70, "National Electrical Code." This raceway is intended for installation and use in accordance with the following information.

PRODUCT MARKINGS

The number, type and size of conductors which may be installed in the certified raceway is marked on the raceway, on the installation instruction sheet or on the package in which it is shipped.

RELATED PRODUCTS

Some luminaires covered under Fluorescent Surface-mounted Luminaires (IEUZ) are suitable for use as raceway.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 5A, "Nonmetallic Surface Raceways and Fittings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Surface Nonmetallic Raceway," "Surface Nonmetallic Raceway Base for Use with Labeled Raceway Cover" or "Surface Nonmetallic Raceway Cover for Use with Labeled Raceway Base."

The Listing Mark is applied to each length or package of complete raceway, raceway cover or raceway base.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Surface Nonmetallic Raceway Fittings (RJYT)

USE

Surface Nonmetallic Raceway Fittings (RJYT)—Continued

This category covers surface nonmetallic raceway fittings intended for installation in accordance with the manufacturer's installation instructions. These fittings are also intended for installation and use in accordance with the following information and the limitations specified in Surface Nonmetallic Raceway (RJTX).

PRODUCT MARKINGS

A fitting for supporting a fixture is marked "Suitable for a fixture not exceeding ____ kg (lb)." The specified fixture weight should not exceed 22.7 kg (lb). The marking is readily visible after the fitting has been mounted.

ADDITIONAL INFORMATION

For additional information, see Surface Nonmetallic Raceway (RJTX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 5A, "Nonmetallic Surface Raceways and Fittings."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Surface Nonmetallic Raceway Fitting," "Butt Joint Cover" or "End Cap," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SURFACE RACEWAY TRANSITION FITTINGS CLASSIFIED FOR USE WITH SPECIFIED PRODUCTS (RKBA)

USE AND INSTALLATION

This category covers surface metal raceway transition fittings certified for use with specific certified surface metal raceway, in accordance with the product installation instructions provided with the product and the details described in the Certification Mark. Transition fittings are intended only for use in transitioning from (connecting together) the certified company's certified raceway to another company's certified raceway.

Installation instructions are provided with the smallest unit container. These instructions indicate the method of mounting and securing the fitting to raceway sections, and include a scale drawing of the raceway, including identification of the raceway material, and provide instructions on the means by which the fitting is intended to be connected. The fitting, smallest unit container or installation instructions are marked with the maximum number, type and size of insulated conductors for which it is intended.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 5, "Surface Metal Raceways and Fittings."

UL MARK

The Classification Mark of UL on the product and on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

SURFACE RACEWAY TRANSITION FITTING FOR USE WITH SURFACE METAL RACEWAY UL LISTED + MANUFACTURED BY [COMPANY NAME]

Control No.

+ Appropriate Listed model or catalog number

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

UNDERFLOOR RACEWAY (RK CZ)

USE

This category covers metal underfloor duct systems designed for use as raceway for the installation of wire and cable in accordance with Article 390

Underfloor Raceway (RKCZ)—Continued

of ANSI/NFPA 70, “National Electrical Code,” and the manufacturer’s installation instructions. This raceway is intended for installation and use in accordance with the following information.

The raceway may consist of factory-constructed raceway or field-assembled components forming a raceway. Each component is provided with installation instructions to identify its relation to the other components of the raceway.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 884, “Underfloor Raceways and Fittings.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Underfloor Raceway.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Underfloor Raceway Fittings (RKQX)

USE

This category covers underfloor raceway fittings for installation in underfloor raceway systems in accordance with the manufacturer’s installation instructions. These fittings are also intended for installation and use in accordance with the following information and the limitations specified in Underfloor Raceway (RKCZ).

Each component is provided with installation instructions to identify its relation to the other components of the raceway system.

ADDITIONAL INFORMATION

For additional information, see Underfloor Raceway (RKCZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 884, “Underfloor Raceways and Fittings.”

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Underfloor Raceway Fitting,” “Raceway Adapter” or “Saddle Support,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RADIO DEVICES FOR USE IN HAZARDOUS LOCATIONS (RMGR)

GENERAL

This category covers portable signal receivers, portable signal and voice receivers, and portable voice transceivers.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product, or the Listing Mark on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service.

The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Radio Device for Use in Hazardous Locations” (or “RAD DEV for Use in Hazardous Locations” or “RAD DEV for Use in HAZ LOC”).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RADIO DEVICES, REBUILT FOR USE IN HAZARDOUS LOCATIONS (RMGZ)

USE

This category covers rebuilt portable signal receivers, portable signal and voice receivers and portable voice transceivers. These products are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt products are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt products are subject to the same requirements as new products.

PRODUCT MARKINGS

These products are marked with the following:

The month and year that the product was repaired or rebuilt.

The standard number and edition to which the product was rebuilt,

as referenced under **REQUIREMENTS**.

RELATED PRODUCTS

See Radio Devices for Use in Hazardous Locations (RMGR).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II, and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Rebuilt Radio Device for Use in Hazardous Locations” (or “Rebuilt RAD DEV for Use in Hazardous Locations” or “Rebuilt RAD DEV for HAZ LOC”) or “Repaired Radio Device for Use in Hazardous Locations” (or “Repaired RAD DEV for Use in Hazardous Locations” or “Repaired RAD DEV for HAZ LOC”).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RADIO DEVICES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (RMJA)

GENERAL

This category covers portable signal receivers, portable signal and voice receivers, and portable voice transceivers.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product, or the Listing Mark on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a

372 RADIO DEVICES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (RMJA)

control number, and the product name "Radio Device for Use in Hazardous Locations" (or "RAD DEV for Use in Hazardous Locations" or "RAD DEV for Use in HAZ LOC").

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RECEPTACLE CLOSURES (RQYF)

GENERAL

This category covers receptacle closures for use with receptacles of ANSI/NEMA WD 6 (1997), "Wiring Devices - Dimensional Specifications," configurations 1-15R and 5-15R. Receptacle closures are products molded of insulating material that are intended to be used with a receptacle to cover the outlet slots a) to reduce drafts through a receptacle on an outside wall of a dwelling, or b) to restrict a child's access to energized contacts.

Receptacle closures that are intended to reduce drafts through a receptacle on an outside wall of a dwelling and that are not intended to restrict a child's access to energized contacts are packaged together with an insulating gasket to be fitted behind the receptacle cover plate. The packaging of such closures are marked to indicate their intended use.

Receptacle closures that are intended to restrict a child's access to energized contacts are not a substitute for adult supervision. The packaging of such closures contains a cautionary marking to this effect.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2255, "Receptacle Closures."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Closure" or "Receptacle Closure" or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RECEPTACLE-PLUG COMBINATIONS FOR USE IN HAZARDOUS LOCATIONS (RRAT)

RECEPTACLE-ENCLOSURE COMBINATIONS WITH PLUGS FOR USE IN HAZARDOUS LOCATIONS (RREG)

GENERAL

This category covers receptacle-enclosure combinations with plugs, which are intended for use in one or more of the following hazardous (classified) locations, as indicated on the product, in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC): Class I, Groups A, B, C and D; Class II, Groups E, F and G.

These products are (1) completely assembled at the factory, or (2) intended for final assembly in the field using components specified in the product certification. Assembly of the receptacle-enclosure combinations with plugs in the field is intended to be in accordance with the instructions provided with the product by the manufacturer.

The enclosures covered under this category are for threaded rigid conduit connection, and the conductors between the receptacle and the enclosure are factory sealed. The plugs are for use with extra-hard-usage flexible cord having a grounding conductor.

The flexible cord connecting to the plugs should be frequently inspected and replaced when necessary. Terminal connection to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at the current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where insulation may be impaired by moisture, dirt or other foreign material.

RECEPTACLE-PLUG COMBINATIONS FOR USE IN HAZARDOUS LOCATIONS (RRAT)

Receptacle-Enclosure Combinations with Plugs for Use in Hazardous Locations (RREG) - Continued

Authorities Having Jurisdiction should be consulted with regard to the conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

Receptacle-enclosure combinations with plugs certified for Class II, Group F locations are intended for use only in atmospheres containing electrically nonconductive dusts, as defined in Article 500 of the NEC.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

RECEPTACLE-ENCLOSURE COMBINATION WITH PLUG FOR USE IN HAZARDOUS LOCATIONS AS TO EXPLOSION AND FIRE HAZARD ONLY CLASS ____, GROUP ____

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RECEPTACLE-PLUG COMBINATION ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (RRHS)

GENERAL

This category covers receptacles intended for use only with certified plugs, and plugs intended for use only with certified receptacles, as specified in the instructions provided with the product. The plugs are for use with extra-hard-usage flexible cord having a grounding conductor.

The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Authorities Having Jurisdiction should be consulted with regard to conditions under which plugs and receptacles will be permitted for use. It is recognized that portable equipment should be used only where necessary.

Receptacles and plugs certified for use in Class II, Group F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY*] FOR USE WITH LISTED * SPECIFIED IN THE INSTRUCTIONS PROVIDED WITH THE PRODUCT

Control No.

*** RECEPTACLE or PLUG**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RECEPTACLES WITH PLUGS FOR USE IN HAZARDOUS LOCATIONS (RROR)

GENERAL

This category covers receptacles with plugs for use as follows: Receptacles with plugs certified under Class I and Class II groups for Division 1 locations are provided with receptacle conduit boxes for threaded rigid conduit connection, and the conductors between receptacles and conduit boxes are factory sealed. The plugs are for use with extra-hard-usage flexible cord having a grounding conductor. Receptacles certified for Class I, Division 2 locations only are intended for use with general purpose enclosures for supply connections. The supply conductors are factory sealed in the receptacles. The plugs for use with such receptacles are suitable for Class I, Division 1 locations.

Receptacles with plugs for groups under Class I hazardous locations have been subjected to endurance tests and overload operation tests in the presence of the specific flammable vapor-air atmospheres.

Receptacles with plugs for any of the groups under Class II hazardous locations have dust-tight terminal boxes and have been subjected to endurance tests and overload operation tests while heavily blanketed with combustible dust. Receptacles with plugs certified for Class II, Group F locations are intended for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of ANSI/NFPA 70, "National Electrical Code."

The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Some receptacles and plugs are certified for "Reverse Service" applications on marine vessels, for conformity to the installation and use provisions of the United States Coast Guard (USCG) Electrical Engineering Regulations 46CFR110, "General Provisions," 46CFR111, "Electric Systems - General Requirements," 46CFR112, "Emergency Lighting and Power Systems," and 46CFR113, "Communication and Alarm Systems and Equipment," as identified in the individual certifications and marked on the product. Reverse service plugs and receptacles are not suitable for applications other than those governed by the above USCG regulations.

Authorities Having Jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Plug for Hazardous Locations," "Receptacle Assembly for Hazardous Locations," "Reverse Service Plug for Hazardous Locations" or "Reverse Service Receptacle for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RECEPTACLES WITH PLUGS INTERLOCKED WITH CIRCUIT BREAKERS FOR USE IN HAZARDOUS LOCATIONS (RSBZ)

GENERAL

This category covers receptacles with plugs interlocked with circuit breakers as follows:

Receptacles with plugs interlocked with circuit breakers certified under Class I and Class II groups are constructed with an interlocked circuit breaker and plug so that the plug cannot be withdrawn or inserted when the circuit breaker is closed. These devices have provision for connection of threaded rigid conduit to the circuit breaker compartments and the plugs are for use with extra-hard-usage flexible cord having a grounding conductor.

Receptacles with Plugs Interlocked with Circuit Breakers for Use in Hazardous Locations (RSBZ)–Continued

Receptacles with plugs interlocked with circuit breakers certified for Class II, Group F locations are intended for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of ANSI/NFPA 70, "National Electrical Code."

The flexible cord connecting to these devices should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plugs and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Authorities Having Jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Receptacle Interlocked with Circuit Breaker for Hazardous Locations" or "Plug for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RECEPTACLES WITH PLUGS INTERLOCKED WITH SWITCHES FOR USE IN HAZARDOUS LOCATIONS (RSPX)

GENERAL

This category covers receptacles that are (1) completely assembled at the factory or (2) intended for final assembly in the field using components specified in the individual certifications. Final assembly of receptacles in the field is intended to be done in accordance with instructions provided with the product by the manufacturer.

Receptacles with plugs interlocked with switches certified under Class I and Class II groups are constructed with an interlocked switch and plug so that the plug cannot be withdrawn or inserted when the switch is closed. These devices have provision for connection of threaded rigid metal conduit to the switch compartments. The plugs are for use with extra-hard-usage flexible cord having a grounding conductor.

Receptacles with plugs interlocked with switches certified for Class II, Group F locations are intended for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of ANSI/NFPA 70, "National Electrical Code."

Devices that are provided with a factory seal of conductors between the switch and the conduit box are so identified on the individual products.

The flexible cord connecting to these devices should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Authorities Having Jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as

PRODUCT CATEGORIES BY CATEGORY CODE

RECEPTACLE-PLUG COMBINATIONS FOR USE IN HAZARDOUS LOCATIONS (RRAT)

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Receptacles with Plugs Interlocked with Switches for Use in Hazardous Locations (RSPX)—Continued

illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Receptacle Interlocked with Switch for Hazardous Locations," "Plug for Hazardous Locations," "Receptacle Cover Assembly Interlocked with Switch for Hazardous Locations" or "Body Assembly for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RECEPTACLE-PLUG COMBINATIONS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (RSUN)

RECEPTACLES WITH PLUGS INTERLOCKED WITH SWITCHES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (RSZD)

USE

This category covers receptacles that are (1) completely assembled at the factory, or (2) intended for final assembly in the field using components specified in the individual certifications. Final assembly of receptacles in the field is intended to be done in accordance with instructions provided with the product by the manufacturer. Care should be taken to ensure that minimum IP ratings are maintained for field-assembled increased safety enclosures.

Receptacles with plugs interlocked with switches are constructed with an interlocked switch and plug so that the plug cannot be withdrawn or inserted when the switch is closed. These devices have provision for connection of threaded rigid metal conduit or other suitable wiring method to the switch compartments. The plugs are for use with Type S, SO, ST or STO flexible cord having a grounding conductor.

The flexible cord connecting to these devices should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Authorities Having Jurisdiction should be consulted with regard to conditions under which these devices are permitted for use. Portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 1682, "Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Receptacle Interlocked with Switch for Hazardous Locations," "Plug for Hazardous Locations," "Receptacle Cover Assembly Interlocked with Switch for Hazardous Locations," "Body Assembly for Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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RECEPTACLES (RTDV)

GENERAL

RECEPTACLES (RTDV)

This category covers the following attachment plug products: 1) receptacles for plugs and attachment plugs, 2) stage-type receptacles, 3) combination receptacles with switches, and 4) utility service receptacles.

The above products include the following:

Appliance, Equipment or Fixture Outlet — A female contact device for mounting on utilization equipment.

Receptacle — A female contact device intended to be installed on a wiring system to supply current to utilization equipment.

This category may also cover the following types of products of a non-standard configuration blade or slot configuration type, which are part of a manufacturer's line of wiring devices, including receptacles. Other similar devices are covered under Attachment Plugs, Fuseless (AXUT), Attachment Plugs with Switches (AYIR) and Attachment Plugs with Overload Protection (AYVZ).

Attachment Plug — A male contact device for the temporary connection of a flexible cord or cable to a receptacle, cord connector, or other female outlet device.

Cord Connector — A female contact device intended to be wired on flexible cord for use as an extension from an outlet to make a detachable electrical connection to an attachment plug or, as an appliance coupler, to a male inlet.

Male Inlet (Equipment Inlet, Motor Attachment Plug) — A male contact device intended to be mounted on utilization equipment to provide a detachable electrical connection to an appliance coupler or cord connector.

This category does not cover devices intended to be molded on flexible cord or wire, or unassembled devices intended to be factory assembled on flexible cord or wire. Such devices are complete only after installation of the flexible cord or wire and are investigated as part of a complete assembly.

RATINGS

These devices are rated 600 V or less, ac or dc; and 200 A or less. They may also be rated in horsepower as noted in the individual product categories.

Devices rated 250 V are tested on circuits involving a nominal potential to ground of 125 V. Devices having other voltage ratings are tested on circuits involving full rated potential to ground, except for multiphase rated devices, which are tested on circuits consistent with their voltage ratings (e.g., a 120/208 V, 3-phase device is tested on a circuit involving 120 V to ground).

Devices marked "Not for Current Interruption" are not intended to be disconnected while under load. They are intended to be installed in series with switches or other appropriate disconnecting means.

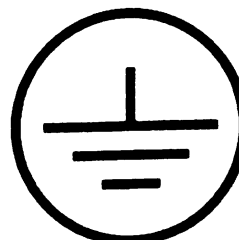
TERMINALS

The terminations of devices intended to be wired to flexible cord are based on the use of flexible cord or cable having copper conductors, in accordance with Article 400 of ANSI/NFPA 70, "National Electrical Code" (NEC). The ampacity of the flexible cord and cable is based on Section 400.5, Tables 400.5(A) and 400.5(B). The conductors are sized as specified on the product or in the manufacturer's instructions provided with the device. The terminations are based on the use of 60°C flexible cord or cable.

Unless stated otherwise in the individual product categories, the termination provisions of all other devices are based upon the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in circuits rated more than 100 A, as specified in Table 310.16 of the NEC.

GROUNDING

Devices having a terminal identified by a green-colored finish, the words "Green" or "Ground" (or the letters "G" or "GR"), or the symbol with or without the circle are grounding types. The blade, pin or contact member



connected to this terminal is for equipment grounding only.

ENCLOSURES

In general, devices having integral enclosures or installed as intended have been investigated for use indoors, in dry locations. All such Listed products provide a degree of protection against ordinary corrosion, accidental contact with live parts, and a limited amount of falling dirt. Some devices have been investigated for use in other operating environments when unmated and when mated with other devices in the same manufacturer's line of products. They are marked with one of the type designations 2 through 6, 12 and 13 indicated in Electrical Equipment for Use in Ordinary Locations (AALZ). All outdoor types provide a degree of protection against rain, snow and sleet. Outdoor types are also suitable for use indoors if they meet the environmental conditions present. A device that complies

with the requirements for more than one type of enclosure may be marked with multiple designations. Complete use and mating information is provided in the installation instructions provided with each device.

WET AND DAMP LOCATIONS

Receptacles provided with integral outlet box covers or cover plates for flush-mounted wiring devices may be identified for use in damp or wet locations as defined in the Nec. If the cover provides protection only when it is closed, the combination is marked "Wet Location When Cover Closed" and may be marked "Damp Location."

RELATED PRODUCTS

This category does not cover pin-and-sleeve-type devices; see Attachment Plugs, Pin-and-Sleeve Type (QLHN) and Receptacles, Pin-and-Sleeve Type (QLIW).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RECEPTACLES FOR PLUGS AND ATTACHMENT PLUGS (RTRT)

GENERAL

This category covers general-use receptacles for use in wiring systems recognized by ANSI/NFPA 70, "National Electrical Code" (NEC), and outlets for use in appliances and fixtures. It also covers some attachment plugs, male inlets, and cord connectors with nonstandard slot or blade configurations which are part of a line of wiring devices including receptacles. Other similar attachment-plug devices are covered under Attachment Plugs (AXGV).

PRODUCT TYPES

Flush Receptacles — Flush receptacles are intended for mounting in or on an outlet box, an outlet-box cover or a cover plate for flush-mounted wiring devices for fixed installation on a branch circuit. They are not intended to be field mounted on outlet-box covers solely by the center cover-plate screw. They may be employed in damp and wet locations when installed in an appropriate enclosure. See Metallic Outlet Boxes (QCIT) and Nonmetallic Outlet Boxes (QCMZ) for information on outlet boxes and covers suitable for use in damp and wet locations.

Self-grounding Receptacles — Self-grounding receptacles have special integral means for establishing the grounding circuit between device yokes and (1) the grounded metallic flush-type boxes, or (2) the grounded nonmetallic flush-device boxes employing a grounding strap and terminal; without the use of bonding jumpers as permitted by Section 250.146(B) (formerly Exception No. 2 to Section 250-74) of the NEC. These devices are identified by the statement: "This receptacle is Listed by Underwriters Laboratories Inc. and has a special pressure spring clip to establish the grounding circuit between device yokes and (1) the grounded metallic flush-type boxes, or (2) the grounded nonmetallic flush device boxes employing a grounding strap and terminal; without the use of bonding jumpers as permitted by Section 250.146(B) of the National Electrical Code" (or equivalent wording), which may appear on the device or shipping carton.

Isolated Ground Receptacles — Grounding-type receptacles in which the grounding terminals are purposely insulated from the mounting means of receptacles and associated metal cover plates as permitted by Section 250.146(D) (formerly Exception No. 4 to Section 250-74) of the NEC are so identified by an orange triangle marked on the face of the receptacle.

Receptacles for Use in Hospitals — Receptacles for hospital use in other than hazardous (classified) locations in accordance with Article 517 of the NEC are identified (1) by the marking "Hospital Only" (used to identify a specific grounding locking configuration rated 20 A, 125 V used for the connection of mobile x-ray and similar equipment), or (2) by the marking "Hospital Grade" and a green dot on the face of the receptacle. The identification is visible during installation on the wiring system or, in the case of the appliance outlet, after installation on the utilization equipment.

Tamper-resistant Receptacles — Receptacles for use in dwelling units in accordance with the NEC, specifically, Section 406.12, or pediatric patient care areas in accordance with Article 517 of the NEC. Tamper-resistant receptacles are identified by the words "Tamper Resistant" (or the letters "TR") where they will be visible after installation with the cover plate removed. Tamper-resistant receptacles may be of the general grade, hospital grade or isolated ground type.

Self-contained Receptacles — Self-contained receptacles include an enclosure and mounting means intended for flush mounting without the use of a separate flush device or other outlet box. They are intended for use with Types NM and NMC cable in accordance with the NEC, specifically, Sections 300.15(E), 334.40(C), 545.10, 550.15(I) Exception, 551.47(E) Exception No. 1 and 552.48(E) Exception No. 1, and are so identified by specific markings on the carton in which they are packed. Devices employing insulation-displacement terminals are intended for assembly

Receptacles for Plugs and Attachment Plugs (RTRT)—Continued

with specific installation tools only. Reference must be made to the installation instructions regarding the proper tool and the number of cables (per entry) with which the devices are intended to be used.

Surface Receptacles — Surface receptacles include an enclosure and mounting means for surface mounting without the use of a separate outlet box. They are intended for connection to exposed nonmetallic-sheathed cable as permitted by Article 336 of the NEC. Some may also accept other wiring systems. Surface receptacles rated 50 A that employ enclosures of insulating materials are not intended for use in applications where they are likely to be subject to severe mechanical abuse.

Pendant Receptacles — Pendant receptacles include an enclosure with cover plate and strain-relief means, intended to be assembled at the end of flexible cord, for use in branch-circuit applications.

Display Receptacles — Display receptacles are provided with a cover plate for flush-mounted wiring devices or outlet-box cover and closure plug or plugs. They are intended for use in show window floors and similar locations where the device is not likely to be subjected to scrub water. They are not intended to be used as substitutes for floor boxes, which are covered under Metallic Outlet Boxes (QCIT) and Nonmetallic Outlet Boxes (QCMZ).

Weather-resistant Receptacles — Receptacles for use in wet and damp locations in accordance with Article 406 of the NEC. Weather-resistant receptacles are identified by the words "Weather Resistant" (or the letters "WR") where they will be visible after installation with the cover plate secured as intended.

Interchangeable (Modular) Receptacles — Interchangeable receptacles are flush receptacles that are assembled as single, duplex or triplex outlets in the field from a system of individual outlet modules, mounting yokes, and/or cover plates for flush-mounted wiring devices.

Appliance, Equipment and Fixture Outlets — When an outlet is installed in equipment with a conductive mounting surface, the face of the receptacle should project a minimum of 3/32 in. and a maximum of 3/16 in. from the mounting surface.

A receptacle employing an integral thermal-interruption mechanism is not intended for hospital locations or other locations where critical patient care equipment is used. Additionally, a receptacle employing an integral thermal-interruption mechanism has not been investigated for its ability to reduce the safety hazards caused by overheating and overloaded circuits.

A receptacle employing an integral thermal-interruption mechanism has been investigated to confirm the manufacturer's stated thermal-interruption temperature range.

Federal Specification — Some receptacles in this category have been investigated to Federal Specification W-C-596, "General Specification for Electrical Power Connectors."

TERMINALS

Terminals of 15 and 20 A receptacles not marked "CO/ALR" are for use with copper and copper-clad aluminum conductors only. Terminals marked "CO/ALR" are for use with aluminum, copper and copper-clad aluminum conductors.

Terminals of receptacles rated 30 A and above not marked "AL-CU" are for use with copper conductors only. Terminals of receptacles rated 30 A and above marked "AL-CU" are for use with aluminum, copper and copper-clad aluminum conductors.

Terminals marked "75 C" may be wired using the ampacities for conductors rated 75°C as well as conductors rated 60°C in Table 310.16 of the NEC.

Terminals of the wire-binding screw, setscrew, or screw-actuated back-wired clamping types are suitable for use with both solid and stranded building wires.

Terminals of a receptacle are permitted for use with certified field-installed crimped-on wire connectors or an assembly, if so identified by the manufacturer.

A receptacle may also be provided with conductor leads with factory-installed crimped-on connectors. Such connectors may be either attached to the receptacle terminal or are provided with the receptacle in the smallest unit shipping container and are suitable for use with the terminal of the receptacle.

Screwless terminal connectors of the conductor push-in type (also known as "push-in-terminals") are restricted to 15 A branch circuits and are for connection with 14 AWG solid copper wire only. They are not intended for use with aluminum or copper-clad aluminum wire, 14 AWG stranded copper wire, or 12 AWG solid or stranded copper wire.

Single and duplex receptacles rated 15 and 20 A that are provided with more than one set of terminals for the connection of line and neutral conductors have been investigated to feed branch-circuit conductors connected to other outlets on a multi-outlet branch circuit, as follows:

- Back-wire (screw-actuated clamp type) terminations with multiple wire-access holes used concurrently to terminate more than one conductor

RECEPTACLES (RTDV)

Receptacles for Plugs and Attachment Plugs (RTRT)—Continued

- Side-wire (binding screw) terminals used concurrently with their respective push-in (screwless) terminations to terminate more than one conductor

Single and duplex receptacles rated 15 and 20 A that are provided with more than one set of terminals for the connection of line and neutral conductors have not been investigated to feed branch-circuit conductors connected to other outlets on a multi-outlet branch circuit, as follows:

- Side-wire (binding screw) terminal with its associated back-wire (screw-actuated clamp type) terminal
- Multiple conductors under a single binding screw
- Multiple conductors in a single back-wire hole

Duplex receptacles rated 15 and 20 A that are provided with break-off tabs may have those tabs removed so that the two receptacles may be wired in a multi-wire branch circuit or multiple branch circuits.

HORSEPOWER RATINGS

In addition to ampere and voltage ratings, standard AC horsepower ratings corresponding to the ampere and voltage ratings for specific general-use receptacles not incorporating overcurrent protection or a switch are given in the table below. For a Design E motor rated more than 2 horsepower, it is necessary to use a receptacle having a horsepower rating not less than 1.4 times the standard AC horsepower rating. The NEMA configuration designation is included for reference. Devices of configurations other than those indicated in the table have horsepower ratings only if such ratings are marked on the device.

HORSEPOWER RATINGS FOR NEMA CONFIGURATION RECEPTACLES

Amps Rating	AC V Rating	No. of Phase	No. of Poles	No. of Wire	NEMA Dsg	HP Rating
15	125	1	2	2	1-15, L1-15	1/2
	125	1	2	3	5-15, L5-15	1/2
	250	1	2	2	2-15	1-1/2#, %
	250	1	2	3	6-15, L6-15	1-1/2#, %
	277	1	2	3	7-15, L7-15	2
	125/250	1	3	4	14-15	1-1/2 L-L#, % 1/2 L-N
	250	3	3	3	11-15, L11-15	2
	250	3	3	4	15-15	2
	120/208	3	4	4	18-15	2
	20	125	1	2	3	5-20, L5-20	1
250	1	2	2	2	2-20, L2-20	2#, %
250	1	2	3	3	6-20, L6-20	2#, %
277	1	2	3	3	7-20, L7-20	2
480	1	2	3	3	L8-20	3
125/250	1	3	3	3	10-20, L10-20	2 L-L#, % 1 L-N
125/250	1	3	4	4	14-20, L14-20	2 L-L#, % 1 L-N
250	3	3	3	3	11-20, L11-20	3
250	3	3	4	4	15-20, L15-20	3
20	480	3	3	3	L12-20	5
480	3	3	4	4	L16-20	5
120/208	3	4	4	4	18-20, L18-20	2
120/208	3	4	5	5	L21-20	2
277/480	3	4	4	4	L19-20	5
277/480	3	4	5	5	L22-20	5
30	125	1	2	3	5-30, L5-30	2
250	1	2	2	2	2-30	2#, %
250	1	2	3	3	6-30, L6-30	2#, %
277	1	2	3	3	7-30, L7-30	3
480	1	2	3	3	L8-30	5
125/250	1	3	3	3	10-30, L10-30	2 L-L#, % 2 L-N
125/250	1	3	4	4	14-30, L14-30	2 L-L#, % 2 L-N
250	3	3	3	3	11-30, L11-30	3
250	3	3	4	4	15-30, L15-30	3
480	3	3	3	3	L12-30	10
480	3	3	4	4	L16-30	10
120/208	3	4	4	4	18-30, L18-30	3
120/208	3	4	5	5	L21-30	3
277/480	3	4	4	4	L19-30	10
277/480	3	4	5	5	L22-30	10
50	125	1	2	3	5-50	2
250	1	2	3	3	6-50	3#, %

RECEPTACLES (RTDV)

Receptacles for Plugs and Attachment Plugs (RTRT)—Continued

Amps Rating	AC V Rating	No. of Phase	No. of Poles	No. of Wire	NEMA Dsg	HP Rating
60	277	1	2	3	7-50	5
	125/250	1	3	3	10-50	3 L-L#, % 2 L-N
	125/250	1	3	4	14-50	3 L-L#, % 2 L-N
	250	3	3	3	11-50	7-1/2
	250	3	3	4	15-50	7-1/2
	120/208	3	4	4	18-50	7-1/2
	125/250	1	3	3	14-60	3 L-L#, % 2 L-N
	250	3	3	4	15-60	10
	120/208	3	4	4	18-60	7-1/2
	L-L#:	Motor connected line-to-line				
L-N:	Motor connected line-to-neutral					

%: Also suitable for 208 V motor applications at the indicated horsepower rating

For three-phase devices, the horsepower ratings indicated are for three-phase motor loads.

Refer to ANSI/NEMA WD 6 (2002), "Wiring Devices – Dimensional Specifications," for configurations of the NEMA designations.

ADDITIONAL INFORMATION

For additional information, see Receptacles (RTDV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 498, "Attachment Plugs and Receptacles."

Where indicated in the individual certifications, receptacles have additionally been investigated to Federal Specification W-C-596, "General Specification for Electrical Power Connectors."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Attachment Plug," "Plug," "Receptacle" (or "Recept."), "Attachment Plug with Overload Protection," "Attachment Plug Fuseless," or other appropriate product name as shown in the individual Listings.

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RECEPTACLES, STAGE TYPE (RUF)

USE

This category covers attachment plugs, cord connectors, equipment outlets, male inlets and receptacles intended for use in theater and stage applications in accordance with Articles 520 and 530 of ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 498, "Attachment Plugs and Receptacles."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Plug," "Connector," "Stage Type Plug," "Stage Type Connector," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMBINATION RECEPTACLES WITH SWITCHES (RUSZ)

GENERAL

This category covers combination receptacle and switch devices on the same mounting yoke, intended for household, office and industrial applications.

These devices are marked as follows:

- a. Listee's name or identification on device
- b. Catalog number or equivalent on device or carton
- c. Complete electrical rating
- d. Terminal identification
- e. Date code
- f. Additional markings as required in the Reports

RELATED PRODUCTS

See Snap Switches (WJQR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 498, "Attachment Plugs and Receptacles," and ANSI/UL 20, "General-Use Snap Switches."

UL MARK

The Listing Mark of UL on the product, or the UL symbol stamped or molded into the product and the Listing Mark on the smallest unit packaging is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Receptacle/Switch."

In lieu of the UL symbol stamped or molded into the product, "UNDERWRITERS LABORATORIES INC. LISTED" (or "UND. LAB. INC. LIST.") may be stamped or molded into the product. When marked as such, the Listing Mark shall appear on the smallest unit packaging.

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SINGLE-POLE, LOCKING-TYPE SEPARABLE ATTACHMENT PLUGS, PANEL INLETS, PANEL OUTLETS, ADAPTERS AND ACCESSORIES (RUUS)

GENERAL

This category covers single-pole, locking-type separable attachment plugs, cord connectors, panel inlets, panel outlets, adapters and accessories, rated up to a maximum of 800 A and up to 600 V ac or dc. These devices are intended to provide power from feeders or branch circuits, or are for direct connection to feeders or branch circuits in accordance with ANSI/NFPA 70, "National Electrical Code."

These devices are not intended for use in hazardous (classified) locations.

Attachment plugs and cord connectors are intended for use with single-conductor cable, having copper conductors only.

Inlets and outlets are intended for use with single-conductor cable, having copper conductors only, or to copper busbars.

CURRENT INTERRUPTION

These devices are not intended for connection or disconnection under load conditions.

INTERMATEABILITY

Devices identified as Series 15, 16 or 18 are capable of being mated together between different Listees' lines of products. Devices that are not identified as Series 15, 16 or 18 are only intended to mate with the Listee's same line of products covered under this category.

Refer to Annex B of ANSI/UL 1691, "Single Pole Locking-Type Separable Connectors," for Series 15, 16 and 18 configurations.

ENVIRONMENTAL RATING

Devices identified as Series 15, 16 or 18 have a minimum environmental enclosure rating of Type 3R when mated, and are marked accordingly. Devices identified other than Series 15, 16 or 18 have a minimum rating of Type 1 and are marked accordingly.

ELECTRICAL RATING

Devices identified as Series 15 are rated 150 A maximum, 600 V maximum.

Devices identified as Series 16 or 18 are rated 400 A maximum, 600 V maximum.

Single-pole, Locking-type Separable Attachment Plugs, Panel Inlets, Panel Outlets, Adapters and Accessories (RUUS)—Continued

Devices identified other than Series 15, 16 or 18 are rated in ampere, voltage and frequency ac or ac/dc, or in maximum ampere, maximum voltage and frequency ac or ac/dc, and are so marked.

GROUNDING DEVICES

Devices designated for connection to the grounded circuit conductor are identified by a white-colored housing. The pin or contact member connected to this terminal is for the grounded conductor only.

Panel inlets and panel outlets designated for connection to the grounded circuit conductor are identified by either a white-colored housing or by housing surfaces colored white adjacent to both the grounded terminal and grounded pin or contact.

GROUNDING

Devices designated for connection to the grounding circuit conductor are identified by a green- or green/yellow-colored housing. The pin or contact member connected to this terminal is for the grounding conductor only.

Panel inlets and panel outlets designated for connection to the grounding circuit conductor are identified by either a green-colored housing or by housing surfaces colored green adjacent to both the grounding terminal and grounding pin or contact.

PRODUCT MARKINGS

These devices are marked with:

1. The Listee's name or identification
2. The electrical rating
3. The statement, "CAUTION – Risk of Electric Shock. Do Not Disconnect Under Load," or equivalent following the word "CAUTION"
4. Series 15, 16 or 18 configurations, if applicable
5. The environmental type rating(s)

ADDITIONAL INFORMATION

For additional information, see Receptacles (RTDV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1691, "Single Pole Locking-Type Separable Connectors."

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Attachment Plug," "Fuseless Attachment Plug," "Plug," "Receptacle" (or "Recept."), "Connector," or other appropriate product name as shown in the individual Listings.

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UTILITY-SERVICE RECEPTACLES (RVNW)

GENERAL

This category covers utility-service receptacles having a unique, nonstandard contact configuration and utilizing the grounded neutral conductor of the supply as the equipment grounding conductor.

These receptacles are intended for mounting in a utility pole and for use in conjunction with a utility-service cord set (see Utility-service Cord Sets [ELFT]) only by authorized utility company personnel in obtaining temporary power from utility poles. They are rated as marked (e.g., 125 V, 15 A).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 498, "Attachment Plugs and Receptacles," with regard to protection from the risk of electrical shock and the ability to function without overheating.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products which have been produced under its Classification and Follow-Up Service.

Utility Service Receptacles

Classified by

Underwriters Laboratories Inc.

as to Protection from Electric Shock
and Ability to Function Without Overheating
No.

Utility-service Receptacles (RVNW)—Continued

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REELS, CORD FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (SAOD)

USE AND INSTALLATION

This category covers cord reels intended for use with extra-hard-usage cord, having a grounding conductor, for connecting portable electrical devices to supply lines. A terminal compartment is provided for connection to threaded rigid conduit systems. Authorities Having Jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only when necessary.

The flexible cord should be inspected frequently and replaced when necessary. Terminal connections to the cord should be properly made and maintained.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 355, "Cord Reels."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cord Reel for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

REELS, CORD FOR USE IN HAZARDOUS LOCATIONS (SAOX)

GENERAL

This category covers cord reels for use with extra-hard-usage flexible cord, having a grounding conductor, for connecting portable electrical devices to supply lines. A terminal compartment is provided for connection to threaded rigid conduit systems.

Authorities Having Jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The flexible cord should be inspected frequently and replaced when necessary. Terminal connections to the cord should be properly made and maintained.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 355, "Cord Reels."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cord Reel for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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REELS, CORD AND CABLE (SBCV)

GENERAL

This category covers reels, usually spring-powered, to pay out and retract flexible cords and cables employed for supply of portable or mobile equipment.

Electrical ratings of reels are marked on the reels where readily visible. The electrical ratings for reels not supplied with cord are based upon the type, size, and length of cord or cable intended for use with the reel. The electrical ratings for reels complete with cord cover the complete assemblies.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 355, "Cord Reels."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cord Reel," "Cable Reel" or "Reel."

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REFRIGERATION EQUIPMENT (SCER)

This category covers mechanical compression refrigeration systems and absorption-type refrigeration systems, including refrigerant-containing components and associated controls.

Some of this equipment may employ water to directly or indirectly cool the refrigerant condenser. Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to connection to water supply and waste disposal lines.

In permanently-wired equipment employing two or more motors or a motor(s) and other loads operating from a single supply circuit, the motor overload protective devices (including thermal protectors for motors) and other factory-installed motor-circuit components and wiring are investigated on the basis of compliance with the motor branch-circuit short-circuit and ground-fault protection requirements of Sections 430.53(C) and 440.22 of ANSI/NFPA 70, "National Electrical Code" (NEC). Such multimotor and combination load equipment is intended to be connected to a branch circuit protected by overcurrent devices which do not exceed the value marked on the data plate or attached wiring diagram. This marked protective-device rating is the maximum for which the equipment has been investigated and found acceptable. If the marking specifies circuit breakers or overcurrent-protective devices, the equipment can be protected by fuses, "HACR Type" circuit breakers, or any properly-sized circuit breakers.

Cord-connected equipment that requires circuit breakers or time-delay fuses to permit restarting is marked to this effect.

Requirements for the installation of refrigeration and air-conditioning equipment that may be field converted/retrofitted to use an alternative refrigerant are contained in the NEC and ANSI/ASHRAE 15, "Safety Standard for Refrigeration Systems."

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REFRIGERATION ACCESSORIES (SCSQ)

Controllers, Refrigeration (SDFY)

GENERAL

This category covers electrical controls designed for refrigeration and air-conditioning equipment and for room temperature or humidity regulation. They are intended for household, commercial or industrial use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

These devices respond directly or indirectly to changes in temperature, humidity, refrigerant level, or pressure to affect temperature control of equipment or appliance operation, etc. These devices may be investigated for functioning during the normal operation (regulating) of the controlled appliance or for functioning in the event of an abnormal condition (limiting) of the controlled appliance.

Ratings — Refrigeration controllers are certified with a maximum rating of 600 V. A control rated in amps is tested with an inductive (75-80% power factor) load for alternating-current ratings unless a direct-current (noninductive) rating is specified.

Manual reset controls — An "M1" or "M2" marking indicates the following manual reset functions are provided:

- **M1** — Controls that automatically reset to the "closed" position after normal operating conditions have been restored if the reset means is held in the "reset" position.
- **M2** — Controls that do not automatically reset to the "closed" position if the reset means is held in the "reset" position.

Equipment suitable for outdoor use — Equipment identified with an enclosure type designation or as "Rain tight" or "Rainproof" is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Class 2 output circuits — A device that incorporates a Class 2 transformer or a Class 2 power source with provision for field wiring of the output circuit is marked to permit wiring as specified in Article 725 of the NEC for the Class 2 circuit.

PRODUCT MARKINGS

Refrigeration controllers are marked with the company name or trademark, a distinctive catalog number, and the electrical ratings. Additional markings may be required based on the individual certification reports.

RELATED PRODUCTS

Safety controls for gas- and oil-fired appliances, electric central furnaces, boilers and duct heaters are covered under Controls, Limit (MBPR), Controls, Primary Safety (MCCZ) or Switches (MFHX). Refrigerant valves are covered under Valves, Electrically Operated (YIOZ).

Electrical temperature controls for heating equipment, motor operators, and wall-mounted room thermostats are covered under Temperature-indicating and -Regulating Equipment (XAPX).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 873, "Temperature-Indicating and Regulating Equipment," or UL 60730-1, "Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements," in addition to one of the following as applicable:

- ANSI/UL 60730-2-2, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Thermal Motor Protectors"
- UL 60730-2-3, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Thermal Protectors for Ballasts for Tubular Fluorescent Lamps"
- UL 60730-2-4, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Thermal Motor Protectors for Hermetic and Semi-Hermetic Motor-Compressors"
- UL 60730-2-6, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Pressure Sensing Controls, Including Mechanical Requirements"
- ANSI/UL 60730-2-9, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Temperature Sensing Controls"
- UL 60730-2-10A, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Motor Starting Relays"
- UL 60730-2-13A, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Humidity Sensing Controls"

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word

Controllers, Refrigeration (SDFY)—Continued

"LISTED," a control number, and the product name "Refrigeration Controller," or other appropriate product name as shown in the individual Listings.

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BEVERAGE COOLERS AND BEVERAGE COOLER-DISPENSERS (SFWY)

GENERAL

This category covers beverage coolers and beverage cooler-dispensers. Beverage coolers are intended to be connected to a field-installed dispensing means. Beverage cooler-dispensers include a factory-installed dispensing means. These products may be self-contained, sectional or remote. Accessories intended for use with beverage coolers and beverage cooler-dispensers are also covered under this category.

INSTALLATION

This equipment is rated 600 V ac or less and is intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," and ANSI/ASHRAE 15, "Safety Standard for Refrigeration Systems."

All units are marked with the refrigerant type; some units may employ alternative refrigerants that are not currently listed in ANSI/ASHRAE 15, but are included in ANSI/ASHRAE 34, "Designation and Safety Classification of Refrigerants." The use of these alternative refrigerants resulted from environmental restrictions on some refrigerants currently listed in the code. Using requirements as applied to specified refrigerants in ANSI/ASHRAE 15, UL's Listing Report available from the manufacturer identifies installation classifications applicable to the alternative refrigerants in the same manner as shown in ANSI/ASHRAE 15 for currently used refrigerants. The refrigerants are classified A1 or A1/A1 by ANSI/ASHRAE 34 and have been determined to comply with ANSI/UL 2182, "Refrigerants."

A beverage cooler or beverage cooler-dispenser of other than the remote type consists of a completely factory assembled and factory tested refrigeration system comprising one or more assemblies which may be shipped separately but which are intended to be used together. If two or more sections are provided, each section is designed and marked for field interconnection with a matched section(s).

A self-contained beverage cooler or beverage cooler-dispenser consists of a completely factory assembled and factory tested refrigeration system in which all the refrigerant-containing parts are connected at the factory.

A remote beverage cooler or beverage cooler-dispenser is intended to be connected to a field-installed condenser or condensing unit located remote from the beverage cooler or beverage cooler-dispenser.

Accessories for beverage coolers and beverage cooler-dispensers are provided with instructions for installation into the product.

Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

PRODUCT MARKINGS

Beverage coolers and beverage cooler-dispensers may be designed to accept accessories installed in the field. In such cases both the beverage cooler or beverage cooler-dispenser and the accessory are marked to relate the two for proper installation.

A section of a beverage cooler or beverage cooler-dispenser suitable for outdoor use is so marked. Sections not so marked are for indoor use only.

Some equipment covered under this category employs replaceable pressurized containers that have not been investigated. Such equipment is marked to indicate it is certified with respect to hazards exclusive of those of the replaceable pressurized container(s).

REBUILT PRODUCTS

This category also covers beverage coolers and beverage cooler-dispensers that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt beverage coolers and beverage cooler-dispensers are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt beverage coolers and beverage cooler-dispensers are subject to the same requirements as new beverage coolers and beverage cooler-dispensers.

RELATED PRODUCTS

Coin-operated equipment is covered under Vending Machines, Refrigerated (SQMX).

Nonrefrigerated dispensing equipment is covered under Food-preparing Machines, Commercial (IPST).

Beverage coolers and dispensers for marine use are covered under Beverage Coolers and Beverage Cooler-Dispensers, Marine (SCEV).

ADDITIONAL INFORMATION

Beverage Coolers and Beverage Cooler-Dispensers (SFWY)—Continued

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 471, "Commercial Refrigerators and Freezers".

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Beverage Cooler," "Beverage Cooler-Dispenser" (for a self-contained unit) "Beverage Cooler Less Condenser," "Beverage Cooler-Dispenser Less Condenser," "Beverage Cooler Less Condensing Unit," "Beverage Cooler-Dispenser Less Condensing Unit" (for a remote beverage cooler or beverage cooler-dispenser), "Section of Beverage Cooler," "Section of Beverage Cooler-Dispenser" (for each section of a beverage cooler or beverage cooler-dispenser shipped separately from the factory, the function of which is essential to the basic operation of the beverage cooler or beverage cooler-dispenser), or "Accessory for Beverage Cooler or Beverage Cooler-Dispenser" (for a part or device, the function of which supplements or modifies the basic operation of the beverage cooler or beverage cooler-dispenser).

For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMMERCIAL REFRIGERATORS AND FREEZERS (SGKW)

GENERAL

This category covers commercial refrigerators and freezers such as display cases, reach-in cabinets, meat cases, frozen food and merchandising cabinets, food service carts and soda fountain units. These products may be self-contained, sectional or remote. Accessories intended for use with commercial refrigerators and freezers are also covered under this category.

INSTALLATION

This equipment is rated 600 V ac or less and is intended to be installed in accordance with the requirements of ANSI/NFPA 70, "National Electrical Code," and ANSI/ASHRAE 15, "Safety Standard for Refrigeration Systems."

All units are marked with the refrigerant type; some units may employ alternative refrigerants that are not currently listed in ANSI/ASHRAE 15, but are included in ANSI/ASHRAE 34, "Designation and Safety Classification of Refrigerants." The use of these alternative refrigerants resulted from environmental restrictions on some refrigerants currently listed in the code. Using requirements as applied to specified refrigerants in ANSI/ASHRAE 15, UL's Certification Report available from the manufacturer identifies installation classifications applicable to the alternative refrigerants in the same manner as shown in ANSI/ASHRAE 15 for currently used refrigerants. The refrigerants used have been determined to comply with ANSI/UL 2182, "Refrigerants."

Unitary refrigerators consist of a complete factory assembled and factory tested refrigeration system comprising one or more assemblies which may be shipped separately but which are intended to be used together. If two or more sections are provided, each section is designed and marked for field interconnection with a matched section(s).

A self-contained refrigerator is a unitary refrigerator consisting of a completely factory assembled and factory tested refrigerating system in which all the refrigerant containing parts are permanently connected at the factory.

A remote refrigerator is a refrigerator intended to be connected to a field-installed condensing unit located remote from the refrigerator.

Remote refrigerators employing carbon dioxide as a refrigerant in a cascade refrigerating system or as a heat-transfer fluid are intended to be connected to a system utilizing pressure-relief valves to reduce the risk of over-pressure. The pressure-relief valves are typically supplied with or connected to the certified compressor rack (see LZFE) or receiver/heat exchanger used in the refrigeration system. The design pressure of the remote refrigerator should be not less than the design pressure of the associated CO₂ system components. The system design pressure is based on the operating pressure as referenced in clause 9.2.6 of ANSI/ASHRAE 15.

Accessories for commercial refrigerators and freezers are provided with instructions for installation into the product.

Commercial Refrigerators and Freezers (SGKW)—Continued

Authorities Having Jurisdiction should be consulted for requirements relating to sanitation and connection to water supply and waste disposal lines.

The U.S. Environmental Protection Agency's Significant New Alternatives Policy (SNAP) Program requirements should be consulted for refrigerators, freezers, and combination refrigerator-freezers in this category that employ a flammable refrigerant (ASHRAE 34 Class A2, A2L or A3). Authorities Having Jurisdiction should also be consulted for any additional requirements.

PRODUCT MARKINGS

Some equipment may be designed to accept accessories installed in the field. In such cases, both the commercial refrigerator or freezer and the accessory are marked to relate the two for proper installation.

Equipment or section(s) of the equipment suitable for outdoor installation are so marked. Units not so marked are for indoor use only.

Commercial refrigerators and freezers may employ a wireway to permit end-to-end installation. The wireway of such units is marked accordingly.

Some equipment covered under this category employs replaceable pressurized containers that have not been investigated. Such equipment is marked to indicate it is certified with respect to hazards exclusive of those of the replaceable pressurized container(s).

Remote refrigerators employing carbon dioxide as a refrigerant in a cascade refrigerating system or as a heat-transfer fluid are marked to indicate their design pressure.

REBUILT PRODUCTS

This category also covers commercial refrigerators and freezers that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt commercial refrigerators and freezers are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt commercial refrigerators and freezers are subject to the same requirements as new commercial refrigerators and freezers.

RELATED PRODUCTS

Refrigerators and freezers for household use are covered under Household Refrigerators and Freezers (SHZZ) and Household Freezers (SHMR).

Specialized refrigerators or freezers are covered under Refrigerators and Freezers, Special Purpose (SOVQ).

Factory-assembled walk-in refrigerators and freezers are covered under Walk-in Units, Commercial (SQTV).

Door panel assemblies are covered under Door Panel Assemblies (FDIT).

Beverage coolers and beverage cooler-dispensers are covered under Beverage Coolers and Beverage Cooler-Dispensers (SFWY).

Nonrefrigerated cabinets are covered under Wired Cabinets (ZNXR).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 471, "Commercial Refrigerators and Freezers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Commercial Refrigerator and/or Freezer" (for a self-contained unit), "Commercial Refrigerator and/or Freezer Less Condensing Unit" (for a remote unit), "Section of Commercial Refrigerator and/or Freezer" (for a section or device, the function of which is essential to the basic operation of the commercial refrigerator or freezer), or "Accessory for Commercial Refrigerator and/or Freezer" (for each part of a commercial refrigerator shipped separately from the factory, the function of which supplements or modifies the basic operation of the commercial refrigerator or freezer).

The Listing Mark for rebuilt commercial refrigerators and freezers also includes the word "Rebuilt," "Remanufactured" or "Reconditioned" preceding the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HOUSEHOLD FREEZERS (SHMR)

GENERAL

This category covers self-contained freezers consisting of a complete refrigeration system. The refrigeration systems are of the mechanical com-

Household Freezers (SHMR)—Continued

pression type, absorption type or thermoelectric type. Accessories intended for use with household freezers are also covered under this category.

This category will be obsolete August 21, 2016. On or before this date, all household freezer certifications will be transferred to Household Refrigerators and Freezers (SHZZ).

INSTALLATION

This equipment is intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code." The equipment is intended for connection to 15 or 20 A, 100 to 140 V or 15 A, 200 to 250 V, single-phase, alternating-current (ac) circuits; or combination ac/dc circuits or direct-current (dc) circuits where the dc voltage does not exceed 30 V.

Household freezers are certified in three classes as follows:

Freestanding — A freezer intended for open type installation only, not including stacking, locating in closets, alcoves, or other confined spaces.

Recessed Installation — A freezer intended to be supported by the floor or base cabinet, located in an enclosed area but not intended to be permanently attached to the building structure, adjacent cabinets or other appliances. These units are also suitable for freestanding installation.

Built-in Installation — A freezer intended to be permanently attached to or mounted in a wall, a cabinet or other surface of a building.

Accessories for household freezers are provided with instructions for installation into the product.

Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to connection to water supply lines.

The U.S. Environmental Protection Agency's Significant New Alternatives Policy (SNAP) Program requirements should be consulted for freezers in this category that employ a flammable refrigerant (ASHRAE 34 Class A2, A2L or A3). Authorities Having Jurisdiction should also be consulted for any additional requirements.

PRODUCT MARKINGS

Household freezers may be designed to accept accessories in the field. In such cases both the freezer and the accessory are marked to relate the two for proper installation.

A freezer intended for freestanding use is so marked on the unit. Each freezer intended for recessed installation has specified installation clearances marked on the unit, if clearances are required.

RELATED PRODUCTS

Household refrigerators are covered under Household Refrigerators and Freezers (SHZZ).

Household refrigerators for marine use are covered under Refrigerators, Household Type, Marine (SVQL).

Refrigerators and freezers for use in recreational vehicles are covered under Recreational Vehicle Refrigerators and Freezers (SKKQ).

Freezers for commercial use are covered under Commercial Refrigerators and Freezers (SGKW).

Refrigerators and freezers in combination with ranges, microwave ovens and/or sinks are covered under Kitchen Units, Refrigerated (SJPT).

Products Verified for energy efficiency are covered under Refrigerators, Freezers and Wine Chillers, Household Verified for Energy Efficiency (ZXJL).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 250, "Household Refrigerators and Freezers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Household Freezer" or "Accessory for Household Freezer."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HOUSEHOLD REFRIGERATORS AND FREEZERS (SHZZ)**GENERAL**

This category covers self-contained refrigerators, freezers, and combination refrigerator-freezers consisting of a complete refrigeration system. The refrigeration systems are of the mechanical compression type, absorption

Household Refrigerators and Freezers (SHZZ)—Continued

type or thermoelectric type. Accessories intended for use with household refrigerators and freezers are also covered under this category.

INSTALLATION

This equipment is intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code." The equipment is intended for connection to 15 or 20 A, 100 to 140 V or 15 A, 200 to 250 V, single-phase, alternating-current (ac) circuits; or combination ac/dc circuits or direct-current (dc) circuits where the dc voltage does not exceed 30 V.

Household refrigerators, freezers, and combinations thereof are certified in three classes as follows:

Freestanding — Intended for open-type installation only, not including stacking, locating in closets, alcoves or other confined spaces.

Recessed Installation — Intended to be supported by the floor or base cabinet, located in an enclosed area but not intended to be permanently attached to the building structure, adjacent cabinets or other appliances. These units are also suitable for freestanding installation.

Built-in Installation — Intended to be permanently attached to or mounted in a wall, a cabinet or other surface of a building.

Accessories are provided with instructions for installation into the product.

Authorities Having Jurisdiction should be consulted for requirements relating to connection to water supply lines.

The U.S. Environmental Protection Agency's Significant New Alternatives Policy (SNAP) Program requirements should be consulted for refrigerators, freezers, and combination refrigerator-freezers in this category that employ a flammable refrigerant (ASHRAE 34 Class A2, A2L or A3).

Authorities Having Jurisdiction should also be consulted for any additional requirements.

PRODUCT MARKINGS

Household refrigerators, freezers, and combinations thereof may be designed to accept accessories in the field. In such cases both the appliance and the accessory are marked to relate the two for proper installation.

A refrigerator, freezer, or combination thereof intended for freestanding use is so marked on the unit. Each appliance intended for recessed installation has specified installation clearances marked on the unit, if clearances are required.

RELATED PRODUCTS

Household freezers may be covered under Household Freezers (SHMR) until August 21, 2016.

Household refrigerators and freezers for marine use are covered under Refrigerators and Freezers, Marine (SVQL).

Refrigerators, freezers, and combinations thereof for use in recreational vehicles are covered under Recreational Vehicle Refrigerators and Freezers (SKKQ).

Refrigerators, freezers, and combinations thereof for commercial use are covered under Commercial Refrigerators and Freezers (SGKW).

Refrigerators in combination with ranges, microwave ovens and/or sinks are covered under Kitchen Units, Refrigerated (SJPT).

Products Verified for energy efficiency are covered under Refrigerators, Freezers and Wine Chillers, Household Verified for Energy Efficiency (ZXJL).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 250, "Household Refrigerators and Freezers," or ANSI/UL 60335-1, "Safety of Household and Similar Appliances, Part 1: General Requirements," and ANSI/UL 60335-2-24, "Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Household Refrigerator," "Accessory for Household Refrigerator," "Household Freezer" or "Accessory for Household Freezer."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ICE CREAM MAKERS (SINX)

GENERAL

This category covers equipment intended for preparing products such as hard ice cream, soft-serve ice cream, milk shakes and sherbets, and may include means for dispensing the product directly into containers. These products may be self-contained or sectional. Accessories intended for use with ice cream makers are also covered under this category.

INSTALLATION

This equipment is rated 600 V or less and is intended to be installed in accordance with ANSI/NFPA 70, “National Electrical Code,” and ANSI/ASHRAE 15, “Safety Standard for Refrigeration Systems.”

All units are marked with the refrigerant type and some units may employ alternative refrigerants that are not currently listed in ANSI/ASHRAE 15, but are included in ANSI/ASHRAE 34-1992 (amendment), “Designation and Safety Classification of Refrigerants.” The use of these alternative refrigerants resulted from environmental restrictions on some refrigerants currently listed in the code. Using requirements as applied to specified refrigerants in ANSI/ASHRAE 15, UL’s Certification Report (available from the manufacturer) identifies installation classifications applicable to the alternative refrigerants in the same manner as shown in ANSI/ASHRAE 15 for currently used refrigerants. The refrigerants are classified A1 or A1/A1 by ANSI/ASHRAE 15 and have been determined to be non-flammable or practically nonflammable in accordance with the requirements in ANSI/UL 2182, “Refrigerants.”

Unitary ice cream makers consist of a complete factory-assembled and factory-tested refrigeration system comprising one or more assemblies that may be shipped separately but intended to be used together. If two or more sections are provided, each section is designed and marked for field interconnection with a matched section(s).

A self-contained ice cream maker is a unitary ice cream maker consisting of a completely factory-assembled and factory-tested refrigerating system in which all the refrigerant-containing parts are permanently connected at the factory.

Accessories for ice cream makers are provided with instructions for installation into the product.

Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water-supply and waste-disposal lines.

PRODUCT MARKINGS

Some equipment covered under this category employs replaceable pressurized containers that have not been investigated. Such equipment is marked to indicate it is certified with respect to hazards exclusive of those of the replaceable pressurized container(s).

Equipment or sections of the equipment suitable for outdoor use are so marked. Units not so marked are for indoor use only.

Some equipment may be designed to accept accessories installed in the field. In such cases, both the ice cream maker and the accessory are marked to relate the two for proper installation.

RELATED PRODUCTS

Ice cream makers (without a compressor) for household use are covered under Food Preparing Machines, Household (IPWZ).

Coin-operated equipment is covered under Vending Machines, Refrigerated (SQMX).

Nonrefrigerated dispensing equipment is covered under Food Preparing Machines, Commercial (IPST).

Beverage coolers and beverage cooler-dispensers are covered under Beverage Coolers and Beverage Cooler-Dispensers (SFWY).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 621, “Ice Cream Makers.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Ice Cream Maker,” “Section of Ice Cream Maker” or “Accessory for Ice Cream Maker.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ICE MAKERS (SJBV)

GENERAL

Ice Makers (SJBV)—Continued

This category covers devices that automatically manufacture and harvest ice in cube, flake, or other readily usable form, with or without provision for storage or means of dispensing ice. These products may be self-contained or sectional. Accessories intended for use with ice makers are also covered under this category.

This category does not cover tray type ice makers, ice vending machines, or ice makers and ice maker kits used in household refrigerators and freezers. See **RELATED PRODUCTS** below.

INSTALLATION

This equipment is rated 600 V or less and is intended to be installed in accordance with ANSI/NFPA 70, “National Electrical Code,” and ANSI/ASHRAE 15, “Safety Standard for Refrigeration Systems.”

All units are marked with the refrigerant type and some units may employ alternative refrigerants that are not currently listed in ANSI/ASHRAE 15, but are included in ANSI/ASHRAE 34, “Designation and Safety Classification of Refrigerants.” The use of these alternative refrigerants resulted from environmental restrictions on some refrigerants currently listed in the code. Using requirements as applied to specified refrigerants in ANSI/ASHRAE 15, UL’s Certification Report (available from the manufacturer) identifies installation classifications applicable to the alternative refrigerants in the same manner as shown in ANSI/ASHRAE 15 for currently used refrigerants. The refrigerants are classified A1 or A1/A1 by ANSI/ASHRAE 34 and have been determined to comply with the requirements of ANSI/UL 2182, “Refrigerants.”

An ice maker of other than the remote type consists of a completely factory assembled and factory tested refrigeration system comprising one or more assemblies that may be shipped separately but intended to be used together. If two or more sections are provided, each section is designed and marked for field interconnection with a matched section(s).

A self-contained ice maker consists of a completely factory assembled and factory tested refrigerating system in which all the refrigerant-containing parts are permanently connected at the factory.

A remote ice maker is an ice maker intended to be connected to a field-installed condenser or condensing unit located remote from the ice maker.

Accessories for ice cream makers are provided with instructions for installation into the product.

Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

PRODUCT MARKINGS

Ice makers may be designed to accept accessories installed in the field. In such cases both the ice maker and the accessory are marked to relate the two for proper installation.

Ice makers or sections of ice makers suitable for outdoor installation are so marked. Ice makers or sections not so marked are for indoor use only.

RELATED PRODUCTS

Coin-operated equipment is covered under Vending Machines, Refrigerated (SQMX).

Ice makers for marine use are covered under Ice Makers, Marine (SAAH). Ice makers for installation into household refrigerators and freezers are Recognized under Specialty Refrigeration Equipment (SROT2).

Accessory ice-maker kits for installation into household refrigerators or freezers are covered under Household Refrigerators and Freezers (SHZZ) or Household Freezers (SHMR).

Products Verified for energy efficiency are covered under Ice Makers Verified for Energy Efficiency (ZWRP).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 563, “Ice Makers.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Ice Maker,” “Ice Maker Without Ice Storage Means” (for a self-contained unit), “Ice Maker Less Condenser,” “Ice Maker Without Ice Storage Means Less Condenser,” “Ice Maker Less Condensing Unit,” “Ice Maker Without Ice Storage Means Less Condensing Unit” (for a remote ice maker), “Section of Ice Maker” (for each section of an ice maker shipped separately from the factory, the function of which is essential to the basic operation of the ice maker), or “Accessory for Ice Maker” (for a part or device, the function of which supplements or modifies the basic operation of the ice maker).

Ice Makers (SJBV)—Continued

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party.

KITCHEN UNITS, REFRIGERATED (SJPT)

GENERAL

This category covers refrigerators rated 250 V or less in combination with ranges, microwave ovens and/or sink units.

INSTALLATION

This equipment is intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to connection to water supply and waste disposal lines, if applicable.

PRODUCT MARKINGS

Kitchen units intended for recessed installation are marked to indicate the installation clearances.

Some equipment may be designed to accept accessories installed in the field. In such cases, both the refrigerated kitchen unit and the accessory are marked to relate the two for proper installation.

RELATED PRODUCTS

Household refrigerators are covered under Household Refrigerators and Freezers (SHZZ).

Household freezers are covered under Household Freezers (SHMR).

Household refrigerators intended for marine use are covered under Refrigerators, Household Type, Marine (SVQL).

Refrigerators intended for use in recreational vehicles are covered under Recreational Vehicle Refrigerators and Freezers (SKKQ).

Refrigerators intended for commercial use are covered under Commercial Refrigerators and Freezers (SGKW).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 250, "Household Refrigerators and Freezers."

The basic standard used to investigate the electric range portion of products in this category is ANSI/UL 858, "Household Electric Ranges."

The basic standard used to investigate the microwave oven portion of products in this category is ANSI/UL 923, "Microwave Cooking Appliances."

The basic standards used to investigate the gas range portion of products in this category are ANSI Z21.1, "Household Cooking Gas Appliances," and ANSI Z21.57, "Recreational Vehicle Cooking Gas Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party.

RECREATIONAL VEHICLE REFRIGERATORS AND FREEZERS (SKKQ)

GENERAL

This category covers refrigerators, freezers, and combination refrigerator-freezers, rated 250 V or less ac and/or 30 V or less dc, intended for use in recreational vehicles.

INSTALLATION

Recreational Vehicle Refrigerators and Freezers (SKKQ)—Continued

These products are certified in two classes as follows:

Freestanding — A unit designed for installation in other than a confined space. Each unit intended for freestanding installation is so marked.

Recessed — A unit designed for installation in a confined space. Each unit intended for recessed installation has specified installation clearances, if clearances are required, marked on the unit.

These products are intended for installation in accordance with the manufacturer's instructions and as marked on the product. They are intended to be secured to the recreational vehicle structure.

RELATED PRODUCTS

Electric household refrigerators and freezers are covered under Household Refrigerators and Freezers (SHZZ) and Household Freezers (SHMR), respectively.

Gas-fired or combination gas/electric recreational vehicle refrigerators are covered under Refrigerators Using Gas Fuel (LPHR).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 250, "Household Refrigerators and Freezers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party.

REFRIGERANT-CONTAINING COMPONENTS (SKQZ)

Condensers, Refrigerant (SLSV)

GENERAL

This category covers refrigerant condensers intended to liquefy refrigerant vapor by removal of heat. They are air-cooled, evaporative or water-cooled types.

PRODUCT MARKINGS

All condensers are marked with the manufacturer's name, model number and the design pressure. Unless provided with a separate marking as indicated below, the products are also marked with the type(s) of refrigerant to be used.

Refrigerant condensers not marked to indicate the type of refrigerant used are provided with a marking that may be on a separate tag or label and attached to the unit cooler that reads "The design pressure marked on this component shall not be less than the installed system working pressure or less than the values outlined in ANSI/ASHRAE 15 for the charged refrigerant."

Finned tube assemblies incorporating a motor-driven fan (forced-air-cooled units) are also marked with the electrical rating. Forced-air-cooled condensers suitable for outdoor installation are so marked.

RELATED PRODUCTS

Water-cooled condensers intended for use as water heaters are covered under Refrigerant Heat Recovery Equipment (SOMU) or Heat Reclaimers, Refrigerant (SNLT).

Condenser receivers are covered under Receivers, Refrigerant (SOJV).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate forced-air-cooled condensers in this category is ANSI/UL 1995, "Heating and Cooling Equipment."

The basic standard used to investigate all other condensers in this category is ANSI/UL 207, "Refrigerant-Containing Components and Accessories, Nonelectrical."

Condensers, Refrigerant (SLSV)—Continued

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Refrigerant Condenser."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

REFRIGERATED MEDICAL EQUIPMENT (SOPT)

GENERAL

This category covers self-contained refrigerated medical equipment, such as oxygen therapy and thermia devices designated for professional use by personnel in hospitals, nursing homes, medical care centers, medical offices and similar health care facilities.

This equipment has been investigated for electric shock, fire and mechanical hazards. Other risks, including those that may result from use of this equipment in the presence of flammable anesthetics, have not been investigated.

INSTALLATION

This equipment is rated 600 V or less and is intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

This equipment has been investigated to determine that it can be properly installed in accordance with the installation instructions provided by the manufacturer.

Patient care equipment employs one of two attachment-plug caps. One is a locking-type cap identified by the marking "Hospital Only" and the other is a nonlocking-type ANSI Standard configuration grounding type cap identified by the marking "Hospital Grade" and a green dot on the body of the cap. The identification is visible after installation on the flexible cord. Such products are marked to indicate they are to be connected to a receptacle marked "Hospital Only" or "Hospital Grade."

Oxygen therapy equipment has been investigated with respect to the increased risks resulting from the presence of oxygen and electrical parts within the equipment. In view of the practical design features, it is essential for safety that all possible sources of ignition be kept away from these devices. Possible sources of ignition, against which precautions should be taken, include open flames, matches, cigarettes, accumulations of static electricity and reducing valves on oxygen tanks, which occasionally project flame or sparks due to ignition or explosion of rubber valve seats. The canopy (tent), reducing valve, oxygen cylinders, etc., used with oxygen therapy equipment have not been investigated nor covered as part of the certified equipment.

FACTORS NOT INVESTIGATED

The effect on a patient of simultaneous use of this equipment with other electrical apparatus and the physiological effects, beneficial or otherwise, which may be produced by this equipment, have not been investigated.

RELATED PRODUCTS

Equipment investigated to determine its suitability or safety for use where a flammable anesthetic is likely to be present is covered under Medical Equipment for Use in Hazardous Locations (PINR).

Nonrefrigerated medical equipment is covered under Medical Equipment (PIDF).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 416, "Refrigerated Medical Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

REFRIGERATED MEDICAL EQUIPMENT or REFRIGERATED OXYGEN THERAPY EQUIPMENT*

AS TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY

Control No.

* or other appropriate product name as shown in the individual Classifications

Refrigerated Medical Equipment (SOPT)—Continued

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

UNIT COOLERS (SPLR)

GENERAL

This category covers unit coolers, which are direct cooling, factory made, enclosed assemblies consisting of a cooling element, fan(s) and motor(s), intended for the free circulation of air for refrigeration purposes. They may also incorporate means for defrosting of the cooling element.

This equipment is rated 600 V or less and is intended for permanent connection to the source of supply in accordance with ANSI/NFPA 70, "National Electrical Code."

This equipment is intended for use in refrigeration systems charged with the refrigerant indicated on the device, but has not been investigated from the standpoint of operation when associated with other equipment used to form the complete refrigeration system.

PRODUCT MARKINGS

These products are marked with the manufacturer's name, model number, electrical rating and the design pressure. Unless provided with a separate marking as indicated below, the products are also marked with the type(s) of refrigerant to be used.

Unit coolers not marked to indicate the type of refrigerant used are provided with a marking that may be on a separate tag or label and attached to the unit cooler that reads "The design pressure marked on this component shall not be less than the installed system working pressure or less than the values outlined in ANSI/ASHRAE 15 for the charged refrigerant. After charging, mark the installed equipment with the refrigerant type and oil used," or equivalent.

A unit cooler with field wiring terminals is marked to indicate the type of conductors required for the field wiring.

RELATED PRODUCTS

Equipment intended for air-conditioning purposes is referenced as fan-coil units and covered under Heating and Cooling Equipment (LZFE).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 412, "Refrigeration Unit Coolers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Unit Cooler."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

UNITS, REFRIGERATING (SPYZ)

GENERAL

This category covers complete refrigeration systems consisting of a hermetic motor-compressor, condenser, evaporator, refrigerant control, electrical controls, wiring and associated refrigerant-containing components including tubing, and may include a defrost system. These systems are primarily used to refrigerate cooling rooms and warehouses intended for the storage of food and other perishable products. These products may be self-contained or sectional. Accessories intended for use with refrigerating units are also covered under this category.

INSTALLATION

This equipment is rated 600 V or less and is intended for permanent connection to the source of supply in accordance with the requirements of ANSI/NFPA 70, "National Electrical Code."

Refrigerating units consist of one or more factory-made sections. If two or more sections are provided, each section is designed and marked for field interconnection with a matched section(s).

Accessories for refrigerating units are provided with instructions for installation into the product.

PRODUCT MARKINGS

Units, Refrigerating (SPYZ)—Continued

The condensing sections of refrigerating units suitable for outdoor installation are so marked. Sections not marked as suitable for outdoor installation are for indoor use only.

Refrigerating units may be designed to accept accessories in the field. In such cases both the refrigerating unit and the accessory are marked to relate the two for proper installation.

REBUILT PRODUCTS

This category also covers refrigerating units that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt refrigerating units are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt refrigerating units are subject to the same requirements as new refrigerating units.

RELATED PRODUCTS

Refrigerated cabinets and cases are covered under Commercial Refrigerators and Freezers (SGKW).

Nonelectrical insulated wall panels are covered under Building Units (BLBT).

Door and frame assemblies for walk-in coolers are covered under Door Panel Assemblies (FDIT).

Factory assembled walk-in refrigerators and freezers are covered under Walk-in Units, Commercial (SQTV).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 427, "Refrigerating Units."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Refrigerating Unit" (for a self contained unit), "Section of Refrigerating Unit" (for a part or device, the function of which is essential to the basic operation of the refrigerating unit), or "Accessory for Refrigerating Unit" (for each part of a refrigerating unit shipped separately from the factory, the function of which supplements or modifies the basic operation of the refrigerating unit).

For rebuilt products, the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

VENDING MACHINES, REFRIGERATED (SQMX)

GENERAL

This category covers refrigerated vending machines designed for connection to alternating-current circuits rated not more than 600 V, and which incorporate refrigeration systems of the air cooled or water-cooled type employing hermetic refrigerant motor-compressors.

This equipment is intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," and ANSI/ASHRAE 15, "Safety Standard for Refrigeration Systems."

Some units may employ alternative refrigerants that are not currently listed in ANSI/ASHRAE 15, but are included in ANSI/ASHRAE 34, "Designation and Safety Classification of Refrigerants." The use of these alternative refrigerants resulted from environmental restrictions on some refrigerants currently listed in the code. Using requirements as applied to specified refrigerants in ANSI/ASHRAE 15, UL's Certification Report (available from the manufacturer) identifies installation classifications applicable to the alternative refrigerants in the same manner as shown in ANSI/ASHRAE 15 for currently used refrigerants. The refrigerants comply with ANSI/UL 2182, "Refrigerants."

This equipment consists of a complete refrigeration system and associated electrical controls for the system and for delivery of the product.

Accessories, such as a coin/currency mechanism and debit/credit card readers, may be field installed. Unless proper and obvious installation of the accessory is evident, instructions for installing the accessory are provided as part of the vending machine.

Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

Vending Machines, Refrigerated (SQMX)—Continued

Where the equipment employs connection to a compressed carbon dioxide source, this category does not cover compressed carbon dioxide cylinders.

Some of this equipment employs replaceable pressurized containers that have not been investigated. Such equipment is marked to indicate it is certified with respect to hazards exclusive of those of the replaceable pressurized container(s).

The burglary and theft features of these machines have not been investigated unless specifically indicated in the individual certification.

REBUILT PRODUCTS

This category also covers refrigerated vending machines that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt refrigerated vending machines are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt refrigerated vending machines are subject to the same requirements as new refrigerated vending machines.

PRODUCT MARKINGS

These products are marked with the manufacturer's name, model number, electrical rating, design pressure and refrigerant type.

The venders are marked on or adjacent to the electrical rating plate with one of the following: "For Indoor Use Only," "Suitable for Protected Locations - See Installation Instructions" or "Suitable for Outdoor Use." Complete instructions appear on a vender intended for use in a protected location, indicating the manufacturer's recommendations concerning the use and/or installation of any canopies, marquees, shelters, etc. which may be necessary for the protection of the vender. The instructions may be located inside the vender if they are accessible through the front door.

RELATED PRODUCTS

For certifications of machines that vend nonrefrigerated products, see Vending Machines (YWXV), or the specific category covering the equipment involved.

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 541, "Refrigerated Vending Machines."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Refrigerated Vending Machine."

For rebuilt products, the word "Rebuilt" or "Remanufactured" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WALK-IN UNITS, COMMERCIAL (SQTV)

GENERAL

This category covers commercial walk-in refrigerators and freezers that are completely factory assembled. Accessories intended for use with walk-in units are also covered under this category.

INSTALLATION

This equipment is rated 600 V or less and is intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," and ANSI/ASHRAE 15, "Safety Standard for Refrigeration Systems."

These units may contain refrigerant-containing components. If refrigerant-containing components are employed, all of the refrigerant-containing parts are permanently connected at the factory and tested for leakage prior to leaving the factory.

All refrigerants that may be employed in this equipment have been investigated to ANSI/ASHRAE 15 and have been determined to be non-flammable or practically nonflammable in accordance with ANSI/UL 2182, "Refrigerants."

Accessories for walk-in units are provided with instructions for installation into the product.

Authorities Having Jurisdiction (AHJ) should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines. AHJs should also be consulted if local installations require structural loading considerations.

PRODUCT MARKINGS

PRODUCT CATEGORIES BY CATEGORY CODE

Walk-in Units, Commercial (SQTV)—Continued

Some equipment may be designed to accept accessories installed in the field. In such cases, both the commercial walk-in unit and the accessory are marked to relate the two for proper installation.

Equipment or sections of the equipment suitable for outdoor installation are so marked. Units not so marked are for indoor use only. Units marked suitable for outdoor installation have not been investigated with respect to wind, snow or other structural loading.

RELATED PRODUCTS

Refrigerated cabinets and cases are covered under Commercial Refrigerators and Freezers (SGKW). Nonelectrical insulated wall panels are covered under Building Units (BLBT). Door and frame assemblies for walk-in coolers are covered under Door Panel Assemblies (FDIT). Refrigeration units are covered under Units, Refrigerating (SPYZ).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 471, "Commercial Refrigerators and Freezers," and UL 427, "Refrigerating Units."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Walk-in Unit" or "Accessory for Commercial Walk-in Unit."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WATER COOLERS (SRAV)**Drinking-water Coolers (SRJX)****GENERAL**

This category covers bottle- and pressure-type drinking-water coolers rated up to 250 V. The coolers are provided with a complete refrigeration system and associated electrical controls, and may also include means for heating water.

This equipment is intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," and ANSI/ASHRAE 15, "Safety Standard for Refrigeration Systems."

Some units may employ alternative refrigerants that are not currently listed in ANSI/ASHRAE 15, but are included in ANSI/ASHRAE 34, "Designation and Safety Classification of Refrigerants." The use of these alternative refrigerants resulted from environmental restrictions on some refrigerants currently listed in the code. Using requirements as applied to specified refrigerants in ANSI/ASHRAE 15, UL's Certification Report (available from the manufacturer) identifies installation classifications applicable to the alternative refrigerants in the same manner as shown in ANSI/ASHRAE 15 for currently used refrigerants. The refrigerants comply with ANSI/UL 2182, "Refrigerants."

These products may contain water purification parts or system(s). However, the parts or system(s) used to purify the water have not been investigated to determine their effectiveness in purifying water unless specifically stated in the individual certifications.

Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

PRODUCT MARKINGS

These products are marked with the manufacturer's name, model number, electrical rating, design pressure and refrigerant type.

RELATED PRODUCTS

See Drinking Water System Components (FDNP) and Drinking Water Treatment Units (FDQD).

Water coolers intended for use in hazardous (classified) locations are covered under Water Coolers for Use in Hazardous Locations (SUFT).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 399, "Drinking-Water Coolers."

UL MARK

Drinking-water Coolers (SRJX)—Continued

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Drinking Water Cooler."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMMERCIAL PROCESSING LIQUID COOLERS (SRFR)**GENERAL**

This category covers coolers intended to condition water or other fluids used for developing photographic film, cooling or thawing bulk product, cooling medical equipment, such as magnetic resonance imagers (MRI) or computer axial topography (CAT) scanners, and similar processes. The fluids intended for use in these coolers are limited to glycol, water, and water with additives. These coolers are not intended for the cooling of potable water. These coolers are provided with a complete refrigeration system and associated electrical controls and may also incorporate means for heating and circulating the water or other fluid.

If intended to be connected to the water supply, Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection.

PRODUCT MARKINGS

These coolers are marked with the manufacturer's name, model number, electrical rating, the refrigerant type, and the high- and low-side design pressures.

A cooler with field wiring terminals is marked to indicate the type of conductors required for the field wiring.

RELATED PRODUCTS

Bottle- and pressure-type potable water coolers are covered under Drinking Water Coolers (SRJX).

Nonrefrigerated fluid-handling systems are covered under Packaged Pumping Systems (QCZ).

Other types of specialized refrigerators are covered under Specialty Refrigeration Equipment (SROT).

Water or liquid chillers specifically for use in semiconductor processing systems are covered under Semiconductor Manufacturing Equipment, Miscellaneous (TWTZ).

ADDITIONAL INFORMATION

For additional information, see Refrigeration Equipment (SCER), Electrical Equipment for Use in Ordinary Locations (AALZ), Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 471, "Commercial Refrigerators and Freezers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Processing Liquid Cooler."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

REFRIGERATION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (SSCR)

ACCESSORIES, REFRIGERATION FOR USE IN HAZARDOUS LOCATIONS (SSPZ)

Controllers, Refrigeration for Use in Hazardous Locations (STDX)

GENERAL

This category covers temperature- and pressure-operated controllers.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Refrigeration Controller for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMMERCIAL REFRIGERATORS AND FREEZERS FOR USE IN HAZARDOUS LOCATIONS (STRV)

GENERAL

This category covers commercial refrigerators and freezers of the self-contained reach-in type, having provision for connection to threaded rigid conduit.

In the storage of any chemicals in the refrigerators and freezers, consideration should be given to the inherent decomposition and reaction hazards of the chemicals.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Refrigerator and/or Freezer for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WATER COOLERS FOR USE IN HAZARDOUS LOCATIONS (SUFT)

GENERAL

This category covers bottled water and line-supplied types of water coolers.

These appliances are self-contained units with a complete refrigeration system and associated electrical controls. The refrigeration system has provision for connection to threaded rigid conduit.

Appliances intended to be connected to external water sources have not been investigated with respect to pollution of water supply through reverse action due to low water pressure or other reasons.

Water Coolers for Use in Hazardous Locations (SUFT)—Continued

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Water Cooler for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SIGNAL AND FIRE ALARM EQUIPMENT AND SERVICES (SYKJ)

This category covers equipment designed for the detection, initiation, notification and control of signals indicative of fire, supervisory, watchman, releasing operation, and the control of the flow of smoke.

This category also covers service companies who are capable of certifying systems that comply with nationally recognized installation standards.

This equipment is intended to be installed, maintained, and operated as system arrangements in conformity with the following:

- ANSI/NFPA 12, "Carbon Dioxide Extinguishing Systems"
- ANSI/NFPA 12A, "Halon 1301 Fire Extinguishing Systems"
- ANSI/NFPA 13, "Installation of Sprinkler Systems"
- ANSI/NFPA 15, "Water Spray Fixed Systems for Fire Protection"
- ANSI/NFPA 16, "Installation of Foam-Water Sprinkler and Foam-Water Spray Systems"
- ANSI/NFPA 17, "Dry Chemical Extinguishing Systems"
- ANSI/NFPA 17A, "Wet Chemical Extinguishing Systems"
- ANSI/NFPA 72, "National Fire Alarm Code"
- ANSI/NFPA 92A, "Recommended Practice for Smoke-Control Systems"
- ANSI/NFPA 92B, "Guide for Smoke Management Systems in Malls, Atria, and Large Areas"

Users of this equipment should consult Authorities Having Jurisdiction (AHJ) concerning the particular types to be used, number and location of appliances, character and installation of wiring, methods to be followed in the receipt and disposition of signals, keeping of records, rendering of reports, and all other details having a bearing on adequate installation, maintenance and use of the system to be employed.

Listed equipment is subjected to investigation to determine its suitability for its intended service and for installation, maintenance and use in conformity with the applicable NFPA standards, with particular regard to design and construction, practicability of application and reliability of performance in addition to the possible electrical hazards involved in its use.

A complete system is considered to be a combination of interrelated signal-initiating devices, signal-transmitting devices, signal-notification appliances and control unit installed in accordance with regulations enforced by the AHJ who determines the suitability of the installation for its particular application. The Listing indicates that wiring diagrams have been submitted with the equipment, which provide details for interconnecting it to other interrelated devices for the intended application. The interconnection details are shown on the equipment or are in a separate installation document provided with the equipment and referenced in the marking on the equipment by drawing number and issue date and/or revision level.

Equipment may be used in different combinations to form a system. All Listed equipment forming the system may be either of one manufacturer or of different manufacturers. The installation wiring diagram provided as a part of the Listed equipment should be consulted for specific details.

A system formed of separately Listed parts to provide a central station fire alarm system may be certificated by a company Listed under Central Station Protective Signaling Services (UUFX).

**SIGNAL AND FIRE ALARM EQUIPMENT AND SERVICES
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A system formed of separately Listed parts to provide a local, auxiliary, remote station, or proprietary fire alarm system may be certificated by a company Listed under Local, Auxiliary, Remote Station, and Proprietary Protective Signaling Services (UUIS).

Products may be Classified in accordance with the applicable Parts of European Norm (EN) 54, "Fire Detection and Fire Alarm Systems." For additional information, see Fire Detection and Alarm Equipment Classified in Accordance with International Publications (UTHN).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AUDIBLE-SIGNAL APPLIANCES (ULSZ)

GENERAL

This category covers electrically operated bells, buzzers, horns and similar signal-sounding appliances for fire-protective signaling service. These appliances are marked with an audibility rating.

Audible-signal appliances intended for fire alarm service, public mode, are rated a minimum 75 dB(A) at 10 ft. Audible-signal appliances intended for fire alarm service, private mode only, are rated a minimum 45 dB(A) at 10 ft.

These appliances are not to be confused with audible-signal appliances for general signaling (nonfire alarm) use, which are covered under Audible-signal Appliances, General Signal (UCST).

PRODUCT MARKINGS

Each product is marked to indicate its intended use. This consists of the term "Audible Signal Appliance," "Audible Signaling Appliance - Private Mode Only," "Audible Signal Appliance Accessory" or "Audible Signaling Appliance Subassembly."

ADDITIONAL INFORMATION

For additional information, see Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 464, "Audible Signal Appliances."

UL MARK

The Signaling Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Fire Alarm Equipment" or "Fire Alarm Subassembly."

Some of these products are also Listed under other Signaling categories. When applicable, the product name may include "and General Signaling" or "and Emergency Signaling," as appropriate (e.g., "Fire Alarm and Emergency Signaling Equipment").

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

- F - Fire Alarm Equipment
- G - General Signaling Equipment
- E - Emergency Signaling Equipment

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CONTROL UNITS, SYSTEM (UOJZ)

GENERAL

This category covers electrical control units for fire-protective signaling systems to be employed in indoor locations in accordance with ANSI/NFPA 72, "National Fire Alarm Code."

Products investigated for outdoor locations are identified in the individual certifications with respect to the installation environment (outdoor), location (dry, damp or wet) and maximum air ambient temperature.

A control unit consists of a unit assembly of electrical parts having provision for connection of power-supply circuits routed through the control unit equipment by a prescribed scheme of circuiting. The circuits are extended to separate devices by which the operating parts of the control units are actuated for signals and to separate or incorporated appliances by which the signals are indicated, so as to form a coordinated system combination for definite signaling services.

The Listee of a control unit furnishes the related actuating devices and signal-indicating appliances for use with the control unit or indicates the

SIGNAL AND FIRE ALARM EQUIPMENT AND SERVICES (SYKJ)

Control Units, System (UOJZ)—Continued

particular devices and appliances required and supplies any instructions necessary to complete their interconnection at the installation.

The individual certifications indicate that wiring diagrams have been submitted with the control unit, along with information regarding its intended application, and the unit has been tested with representative actuating devices and signal-indicating devices to be used with it as an interrelated assembly. Reference is made in the marking of the control unit to the wiring diagram showing complete information except when the installation wiring diagram is secured to the control unit.

Identification of the information in the individual certifications is as follows:

- Local System Type (L)
- Local System Type with Shunt Type Connection to Master Box (LS)
- Auxiliary System Type (A)
- Remote Station System Type (RS)
- Proprietary System Type (P)
- Central Station System Type (CS)
- Protected Premise Unit (Protected Premises Unit or PPU)
- Supervising Station Unit (Receiving Unit or RU)

System Control Unit with Emergency Voice Communication — A system control unit with emergency voice communication consists of a control unit that employs a speaker system in lieu of conventional general alarm-indicating circuits. The control unit may also have additional provision for telephone communication by use of hand sets. A tape deck with a pre-recorded message may also be employed as a supplementary feature.

System Control Unit with Emergency Telephone Communication — A system control unit with emergency telephone communication consists of a control unit with conventional general alarm-indicating circuits and additionally employs telephone communication circuits to remote telephone hand sets for emergency communication during a fire condition, usually for use by fire department personnel.

The types of devices that can be connected for the service indicated in the individual certifications for each type control unit are as follows:

- A - Automatic fire alarm: Thermostats, smoke detectors, etc.
- M - Manual fire alarm: Manually-operated boxes
- WF - Waterflow alarm: Waterflow switches
- SS - Supervisory: Gate valves, water-level switches, temperature switches, carbon monoxide detectors, residential fire alarm control units, etc.
- WSS - Watchman's supervisory service

The type of signaling service applicable to each type of control unit is as follows:

- C - Coded
- NC - Noncoded
- M - March Time
- MX - Multiplex
- 1W-RF - Radio Frequency (one-way private radio)
- 2W-RF - Radio Frequency (two-way private radio)
- Rev Pol - Reverse Polarity
- DAC - Digital Alarm Communicator
- OT - Other Transmission Technologies

Where more than one type of control unit is indicated for a model number, such as Type Fire Alarm (L, LS, A, RS), that particular model is suitable for all the indicated applications. The change from one type to another may be made by deletion or addition of a panel or module inside the control unit cabinet or revisions to operating software to provide the additional function. In other cases a control unit may be suitable for a dual function without any panel changes, such as a Type Fire Alarm (P, RS).

Authorities Having Jurisdiction should be consulted before installation or revision.

PRODUCT MARKINGS

Each complete product is marked to indicate its intended use. This consists of the word "Commercial," followed by "Protected-Premises Control Unit" or "Supervising Station Control Unit," consistent with the description in the individual certifications.

RELATED PRODUCTS

For additional information regarding central station systems, see Central Station Protective Signaling Services (UUFX).

ADDITIONAL INFORMATION

For additional information, see Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 864, "Control Units and Accessories for Fire Alarm Systems."

ADJUNCT SERVICE

UL provides a service for the certification of control units that not only meet the requirements of ANSI/UL 864, but also have been investigated to ANSI/SIA CP-01 (2000, 2007 or 2010), "Control Panel Standard - Features for False Alarm Reduction." See Control Panels, SIA False Alarm Reduction (AMTB).

UL MARK

Control Units, System (UOJZ)—Continued

The Signaling Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Fire Alarm Equipment" or "Fire Alarm Subassembly."

The Listing Mark for fire alarm equipment may include the designation "___ of ___." The first space is stamped with the number indicating the position that the panel occupies in the series of panels constituting the fire alarm equipment. The second space is stamped with the total number of units in the fire alarm equipment.

When applicable, the Security Mark is also included. The combined Signaling/Security Listing Mark consists of the Signaling Mark elements detailed above and the word "SECURITY" above the UL symbol. The product name is "Fire Alarm and Security Equipment" or "Fire Alarm and Security Subassembly."

Some of these products are also Listed under other Signaling and Energy Management, Information Technology or Telephone categories. When applicable, the product name may include "and Hospital Signaling and Nurse Call," "and General Signaling," "and Emergency Signaling," "and Enclosed Energy Management," "and Information Technology" or "and Telephone," as appropriate (e.g., "Fire Alarm and Telephone Equipment").

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

- S – Security Equipment
- F – Fire Alarm Equipment
- HN – Hospital Signaling and Nurse Call Equipment
- G – General Signaling Equipment
- E – Emergency Signaling Equipment
- EM – Enclosed Energy Management Equipment
- IT – Information Technology Equipment
- T – Telephone Equipment

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated to ANSI/SIA CP-01 (2000, 2007 or 2010). The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and one of the following statements as appropriate:

- ALSO CLASSIFIED IN ACCORDANCE WITH ANSI/SIA CP-01-2000
- ALSO CLASSIFIED IN ACCORDANCE WITH ANSI/SIA CP-01-2007
- ALSO CLASSIFIED IN ACCORDANCE WITH ANSI/SIA CP-01-2010

Where model numbers are indicated in the individual Listings, 100% of the manufacturer's production for those models is required to be labeled. Where model numbers are not indicated, the manufacturer is not obliged to label 100% of production.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EMERGENCY COMMUNICATION AND RELOCATION EQUIPMENT (UOQY)

GENERAL

This category covers units intended to be installed as a system for providing emergency voice communication on either a selective or general basis, within multiple-unit installations.

Specific appliances or appliance groups intended for use with this equipment are identified in the individual certifications. Instructions describing interconnection at the installation site are provided with the product, including wiring diagrams.

This equipment is intended to be installed in areas specified by ANSI/NFPA 72, "National Fire Alarm Code." Authorities Having Jurisdiction should be consulted before installation.

PRODUCT MARKINGS

Each product is marked to indicate its intended use. This consists of a specific use description as indicated in the individual certifications.

RELATED PRODUCTS

This equipment differs from Control Unit Accessories, System Equipment (UOXX), providing similar service, in that operation of the equipment is not dependent upon connection to a fire-alarm control unit.

Amplifiers included within or connected to this equipment to form systems are covered under Speakers and Amplifiers for Fire Protective Signal-

Emergency Communication and Relocation Equipment (UOQY)—Continued

ing Systems (UEAY) or, as components for use in emergency communication system applications, under Emergency Communication and Relocation Equipment (UOQY).

ADDITIONAL INFORMATION

For additional information, see Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 864, "Control Units and Accessories for Fire Alarm Systems."

UL MARK

The Signaling Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Fire Alarm Equipment" or "Fire Alarm Subassembly."

The Listing Mark for fire alarm equipment may include the designation "___ of ___." The first space is stamped with the number indicating the position that the panel occupies in the series of panels constituting the fire alarm equipment. The second space is stamped with the total number of units in the fire alarm equipment.

When applicable, the Security Mark is also included. The combined Signaling/Security Listing Mark consists of the Signaling Mark elements detailed above and the word "SECURITY" above the UL symbol. The product name is "Fire Alarm and Security Equipment" or "Fire Alarm and Security Subassembly."

Some of these products are also Listed under other Signaling and Energy Management, Information Technology or Telephone categories. When applicable, the product name may include "and Hospital Signaling and Nurse Call," "and General Signaling," "and Emergency Signaling," "and Enclosed Energy Management," "and Information Technology" or "and Telephone," as appropriate (e.g., "Fire Alarm and Telephone Equipment").

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

- S – Security Equipment
- F – Fire Alarm Equipment
- HN – Hospital Signaling and Nurse Call Equipment
- G – General Signaling Equipment
- E – Emergency Signaling Equipment
- EM – Enclosed Energy Management Equipment
- IT – Information Technology Equipment
- T – Telephone Equipment

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CONTROL UNIT ACCESSORIES, SYSTEM (UOXX)

GENERAL

This category covers electrical units intended for use with fire-protective signaling systems employed in indoor locations in accordance with ANSI/NFPA 70, "National Electrical Code."

Products investigated for outdoor locations are identified in the individual certifications with respect to the installation environment (outdoor), location (dry, damp or wet) and maximum air ambient temperature.

Only amplifiers covered under this category have been investigated for use in fire alarm communication system applications. Speakers for use with amplifiers that have been investigated for fire alarm service applications are covered under Speakers and Amplifiers for Fire Protective Signaling Systems (UUMW).

Authorities Having Jurisdiction should be consulted before installation.

RELATED PRODUCTS

For information regarding central station service, see Central Station Protective Signaling Services (UUFX).

ADDITIONAL INFORMATION

For additional information, see Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 864, "Control Units and Accessories for Fire Alarm Systems."

ADJUNCT SERVICE

PRODUCT CATEGORIES BY CATEGORY CODE

Control Unit Accessories, System (UOXX)—Continued

UL provides a service for the certification of control unit accessories that not only meet the requirements of ANSI/UL 864, but also have been investigated to ANSI/SIA CP-01 (2000, 2007 or 2010), "Control Panel Standard - Features for False Alarm Reduction." See Control Panels, SIA False Alarm Reduction (AMTB).

UL MARK

The Signaling Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Fire Alarm Equipment" or "Fire Alarm Subassembly."

The Listing Mark for fire alarm equipment may include the designation "___ of ___." The first space is stamped with the number indicating the position that the panel occupies in the series of panels constituting the fire alarm equipment. The second space is stamped with the total number of units in the fire alarm equipment.

When applicable, the Security Mark is also included. The combined Signaling/Security Listing Mark consists of the Signaling Mark elements detailed above and the word "SECURITY" above the UL symbol. The product name is "Fire Alarm and Security Equipment" or "Fire Alarm and Security Subassembly."

Some of these products are also listed under other Signaling and Energy Management, Information Technology or Telephone categories. When applicable, the product name may include "and Hospital Signaling and Nurse Call," "and General Signaling," "and Emergency Signaling," "and Enclosed Energy Management," "and Information Technology" or "and Telephone," as appropriate (e.g., "Fire Alarm and Telephone Equipment").

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

- S - Security Equipment
- F - Fire Alarm Equipment
- HN - Hospital Signaling and Nurse Call Equipment
- G - General Signaling Equipment
- E - Emergency Signaling Equipment
- EM - Enclosed Energy Management Equipment
- IT - Information Technology Equipment
- T - Telephone Equipment

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated to ANSI/SIA CP-01 (2000, 2007 or 2010). The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and one of the following statements as appropriate:

- ALSO CLASSIFIED IN ACCORDANCE WITH ANSI/SIA CP-01-2000
- ALSO CLASSIFIED IN ACCORDANCE WITH ANSI/SIA CP-01-2007
- ALSO CLASSIFIED IN ACCORDANCE WITH ANSI/SIA CP-01-2010

Where model numbers are indicated in the individual Listings, 100% of the manufacturer's production for those models is required to be labeled. Where model numbers are not indicated, the manufacturer is not obliged to label 100% of production.

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DETECTORS, AUTOMATIC FIRE (UPLV)

These are either individual devices or prescribed combinations of devices designed to detect flame, heat, smoke, or combustion gases resulting from a fire and to automatically operate electrical signaling contacts. The signaling contacts may be integral parts of an individual device or parts of a separate device to which the detecting element is connected as an extended component.

The signaling contacts of the detector are intended to be connected to the circuit conductors of fire protective signaling systems recognized by the National Fire Protection Association Standards, so that the fire alarm signal initiated by the detector will be indicated by the system.

The kind of system (central station, proprietary, auxiliary, remote station or local) with which the detector can be used depends upon the design of the signaling circuit to which the detector contacts are intended to be connected. A detector may have non-coded signaling contacts connected directly to the actuating circuit of system control unit or to the actuating circuit of an electrically operated transmitter which will transmit coded signals over the signaling line circuit of a local, auxiliary, proprietary, remote station, or central station system.

Detectors, Automatic Fire (UPLV)—Continued

The wiring diagram of the transmitter or system control unit with which the detector is used will indicate the circuit application of the detector.

A combination type detector depends upon two or more related but separate pieces of equipment which are designed to be installed together so as to form a complete detector.

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Smoke-automatic Fire Detectors (UROX)

GENERAL

This category covers detecting combinations designed to detect smoke particles. Smoke detectors may or may not be designed to be connected to fire alarm system control units (see APPLICATIONS).

A heat detector and/or an audible-signaling appliance may be provided integral with the detector.

The primary function of duct detectors is to shut down the blowers and/or dampers of air conditioning and ventilating systems in an attempt to prevent a possible panic and smoke damage from distribution of smoke. Duct detectors are not intended as a substitute for open-area protection.

The level of toxicity produced by the combustibles at which smoke detectors actuate has not been investigated.

DETECTOR TYPES

Photoelectric (P) — Designed to detect an abnormal density of smoke particles, either by obscuration of a projected light path or reflection of light from the smoke particles onto a light-sensitive element.

Ionization (I) — An ionization smoke detector has a small amount of radioactive material that ionizes the air in the sensing chamber, thus rendering it conductive and permitting a current flow through the air between two charged electrodes. This gives the sensing chamber an effective electrical conductance. When smoke particles enter the ionization area, they decrease the conductance of the air by attaching themselves to the ions, causing a reduction in mobility. When the conductance is less than a predetermined level, the detector circuit responds.

Combination Photoelectric/Ionization (P/I) — Employs both principles of detection in one unit.

Projected Beam (PB) — A light beam is projected across the space of area to be protected.

Air Sampling (AS) — Consists of air-sampling ports at the ends of piping or tubing extending from the detector unit to the areas to be protected. A pump draws air from the protected area through the ports and tubing to the detector where the air is analyzed for fire products.

APPLICATIONS

Open-area Protection (OAP) — Requires detector connection to a compatible system control unit for operation.

Releasing Service (RS) — Intended for detector connection only to releasing devices, such as electromagnetic door holders, fire dampers, etc.

Open-area Protection with Releasing Service (OAP/RS) — Incorporates supplementary switching contacts for additional connection to releasing devices.

Duct Detector [D (ST)] — Intended for installation on the side of a duct. Employs sampling tubes that extend into the duct.

Duct Detector [D (I)] — For installation inside a duct.

COMPATIBILITY WITH CONTROL UNITS

Smoke detectors for open-area protection are intended to be connected to the initiating device circuit of a fire alarm system control unit.

Multiple-wire detectors, employing power-supply terminals or leads that do not obtain power from the initiating-device circuit of a system control unit, are compatible with the initiating device circuits of any certified system control unit if (1) failure of the power to the detector is supervised at the control unit, and (2) the smoke detector is powered from a "Regulated" power-supply output, or a "Special Application" power-supply output for which the voltage outputs have been investigated. Compatible models for "Special Application" outputs are indicated on the installation wiring diagram of the control unit and/or detectors.

Two-wire detectors, whose power-supply terminals or leads are the same as the signaling terminals, and obtain power from the initiating-device circuit of a system control unit, are investigated for compatibility either by test or a review of the circuit parameters of both the detector and control unit. Certification is restricted only to those control units with which such an investigation was made. Interconnection limitations and compatible models are indicated on the installation wiring diagram of control unit and/or detectors.

INSTALLATION

Refer to ANSI/NFPA 72, "National Fire Alarm Code," and ANSI/NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems," for installation, maintenance, and testing guidelines.

Smoke-automatic Fire Detectors (UROX)—Continued

Spacings — Although there are no assigned spacings to these detectors, test fires, using the maximum amount of combustible for the risk involved, may be employed. See ANSI/NFPA 72 for additional guidelines.

Environmental Considerations — Open-area detectors are intended for indoor use only where normal ceiling temperatures [max 37.8°C (100°F)] prevail. Care should be used that detectors are not installed in areas where conditions may cause unwanted (false) alarms.

Duct detectors are intended to be installed in ducts of heating, ventilating, and air conditioning systems where temperatures at the detector do not exceed 37.8°C (100°F).

Ionization detectors should not be used in an environment of high-level radiation unless tests in the actual environment have shown that the radiation will not interfere with operation of the detectors.

Effect of Velocity — The velocities indicated in the individual certifications are the maximum and minimum to which the detector has been subjected in performance tests without indication of a false alarm or abnormal shift in sensitivity. The performance of photoelectric-type detectors is not affected by velocity. Velocity limits for duct detectors are based on response to fire tests in ANSI/UL 268A, "Smoke Detectors for Duct Application."

Stability Test — In view of the innumerable environmental conditions that exist in the field, it is recommended that the stability of detectors be monitored prior to connection to a fire alarm system for at least three months or more to screen out locations of detectors where unwanted (false) alarms may occur. Relocation of the detectors, use of a detector with a different principle of operation, or a change in the sensitivity setting where permitted in the marking of the detector may be required.

Authorities Having Jurisdiction should be consulted before installation.

PRODUCT MARKINGS

Each product is marked to indicate its intended use. This consists of one of the following:

For nonseparable heads and bases:

1. Smoke Detector (+) for Open Area Protection
2. Smoke Detector (+) for Open Area Protection. Also Suitable for Releasing Device Service.
3. Smoke Detector (+) for Releasing Device Service
4. Smoke Detector (+) for Duct Application

For separable heads:

1. Smoke Detector Head (+) for Use with a (*) UL Listed Base
2. Smoke Detector Head (+) for Open Area Protection When Used with a (*) UL Listed Base
3. Smoke Detector Head (+) for Open Area Protection When Used with a (*) UL Listed Base. Also Suitable for Duct Application.
4. Smoke Detector Head (+) for Open Area Protection When Used with a (*) UL Listed Base. Also Suitable for Releasing Device Service.
5. Smoke Detector Head (+) for Releasing Device Service When Used with a (*) UL Listed Base
6. Smoke Detector Head (+) for Duct Application When Used with a (*) UL Listed Base
7. Smoke Detector Head When Used with a (*) UL Listed Smoke Duct Detector Housing

For separable bases and duct housing:

1. Detector Base (+) for Use with a (*) UL Listed Head
2. Detector Base (+) for Open Area Protection When Used with a (*) UL Listed Head
3. Detector Base (+) for Open Area Protection When Used with a (*) UL Listed Head. Also Suitable for Duct Application.
4. Detector Base (+) for Open Area Protection When Used with a (*) UL Listed Head. Also Suitable for Releasing Device Service.
5. Detector Base (+) for Open Area Protection When Used with a (*) UL Listed Head. Also Suitable for Releasing Device Service and Duct Application.
6. Detector Base (+) for Releasing Device Service When Used with a (*) UL Listed Head
7. Smoke-Duct Detector Housing for Use with (*) UL Listed Head

For separable system assemblies:

1. Smoke Detector Projected Beam System Unit
 2. Smoke Detector Air Sampling System Unit
 3. Smoke Detector for Duct Application Subassembly
- + To be inserted when applicable: "with Integral Audible Signal," "with Integral Heat Detector" or "with Integral Audible Signal and Heat Detector"

* Company name or File No. (Sxxxx)
Detectors marked with the designation "with Integral Audible Signal" include an audible-signaling appliance in the unit (head or base), which is energized under an alarm condition.

Detectors marked with the designation "with Integral Heat Detector" include a heat detector in the unit, which is connected internally to the smoke detector alarm circuit. Actuation of the head detector results in the same alarm signal as obtained from the smoke detector.

RELATED PRODUCTS

Smoke-automatic Fire Detectors (UROX)—Continued

Combination door closers and holders incorporating automatic smoke detection components are covered under Combination Fire Door Closers and Holders (GTIS).

ADDITIONAL INFORMATION

For additional information, see Detectors, Automatic Fire (UPLV), Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate open-area and releasing-service detectors in this category is ANSI/UL 268, "Smoke Detectors for Fire Alarm Signaling Systems."

The basic standard used to investigate duct detectors in this category is ANSI/UL 268A, "Smoke Detectors for Duct Application."

UL MARK

A two-Listing-Mark system is employed for separable detector heads and bases. This permits the separate shipment of bases and heads to facilitate installation and maintenance. The Listing Marks on the separable units, coupled with a marking to cross-reference the head and the base, identify the parts to be used together to form a complete detector assembly.

The Signaling Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Fire Alarm Equipment" or "Fire Alarm Subassembly."

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

F - Fire Alarm Equipment

Where model numbers are indicated in the individual Listings, 100% of the manufacturer's production for those models is required to be labeled. Where model numbers are not indicated, the manufacturer is not obliged to label 100% of production.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Smoke-automatic Fire Detector Accessories (URRQ)

GENERAL

This category covers smoke detector accessories, which are devices employed to supplement smoke detector operation when connected as part of a fire alarm system or used to validate smoke detector operation. The interconnection is indicated on the installation wiring diagram associated with the detector.

Authorities Having Jurisdiction should be consulted before installation.

PRODUCT MARKINGS

Each product is marked to indicate its intended use as indicated in the individual certifications.

ADDITIONAL INFORMATION

For additional information, see Smoke-automatic Fire Detectors (UROX), Detectors, Automatic Fire (UPLV), Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 268, "Smoke Detectors for Fire Alarm Signaling Systems."

UL MARK

The Signaling Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Fire Alarm Equipment" or "Fire Alarm Subassembly."

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

F - Fire Alarm Equipment

Where model numbers are indicated in the individual Listings, 100% of the manufacturer's production for those models is required to be labeled. Where model numbers are not indicated, the manufacturer is not obliged to label 100% of production.

Smoke-automatic Fire Detector Accessories (URRQ)—Continued

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Smoke Detectors for Special Applications (URXG)
USE AND INSTALLATION

This category covers smoke-automatic fire detectors employing a special construction different from conventional detectors and designed to detect products of combustion in a specific location. These detectors are not intended as a substitute for open-area protection.

These detectors are intended to be installed in accordance with the manufacturer's installation instructions, in a manner acceptable to the Authority Having Jurisdiction and in accordance with ANSI/NFPA 72, "National Fire Alarm Code," or other NFPA Standards that may apply, such as for extinguishing system applications. The sensitivity rating of the detector should be taken into consideration with regard to installation in an area to be protected under operating conditions to guard against false alarms. The detectors may be connected to the initiating-device circuits of certified control units that provide audible-alarm signals, or employed as part of an extinguishing system.

Authorities Having Jurisdiction should be consulted before installation.

Effect of Velocity — The velocities indicated in the individual certifications are the maximum and minimum to which the detector has been subjected in performance tests without indication of a false alarm or abnormal shift in sensitivity. Velocity limits for duct detectors are based on response to fire tests in ANSI/UL 268A, "Smoke Detectors for Duct Application."

Detector Types

Photoelectric (P) — Designed to detect an abnormal density of smoke particles, either by obscuration of a projected light path or reflection of light from the smoke particles onto a light-sensitive element.

Ionization (I) — An ionization smoke detector has a small amount of radioactive material that ionizes the air in the sensing chamber, thus rendering it conductive and permitting a current flow through the air between two charged electrodes. This gives the sensing chamber an effective electrical conductance. When smoke particles enter the ionization area, they decrease the conductance of the air by attaching themselves to the ions, causing a reduction in mobility. When the conductance is less than a predetermined level, the detector circuit responds.

Combination Photoelectric/Ionization (P/I) — Employs both principles of detection in one unit.

Air Sampling (AS) — Consists of air-sampling ports at the ends of piping or tubing extending from the detector unit to the areas to be protected. A pump draws air from the protected area through the ports and tubing to the detector where the air analyzed for fire products.

Video Image Smoke Detector (VI) — Intended to detect the image of smoke from a fire in the area of view covered by a video camera.

PRODUCT MARKINGS

Each product is marked to indicate its intended use. This consists of the term "Smoke Detector for Special Application" or "Smoke Detector Accessory for Special Application."

ADDITIONAL INFORMATION

For additional information, see Smoke-automatic Fire Detectors (UROX), Detectors, Automatic Fire (UPLV), Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standards used to investigate products in this category (with the exception of video image smoke detectors) are ANSI/UL 268, "Smoke Detectors for Fire Alarm Signaling Systems," and ANSI/UL 268A, "Smoke Detectors for Duct Application."

The basic requirements used to investigate video image smoke detectors in this category are contained in UL Subject 268B, "Outline of Investigation for Video Image Smoke Detectors."

UL MARK

The Signaling Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Fire Alarm Equipment" or "Fire Alarm Subassembly."

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

F - Fire Alarm Equipment

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or

Smoke Detectors for Special Applications (URXG)—Continued

any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FIRE ALARM DEVICES, SINGLE AND MULTIPLE STATION, AND ACCESSORIES (UTER)

The following listings cover single- and multiple-station heat and smoke detectors and related accessories intended to be installed in ordinary indoor locations in accordance with Chapter 2 of the National Fire Protection Association Standard No. 72 titled the National Fire Alarm Code.

The levels of toxicity produced by the combustibles at which single- and multiple-station fire alarm devices are actuated have not been investigated by UL.

For a description of the applicable Listing Mark refer to the sub-categories Single- and Multiple-Station Heat Detectors (UTFS) and Single- and Multiple-Station Smoke Detectors (UTGI).

Single- and Multiple-station Heat Detectors (UTFS)

USE AND INSTALLATION

This category covers single- and multiple-station heat detectors intended to be employed in indoor locations.

Single-station Type — Single-station heat detectors are self-contained units incorporating a releasing mechanism, operating mechanism, and an alarm mechanism. In operation, heat actuates the releasing element, permitting stored energy (stored compressed gas or spring) embodied in the unit to sound an alarm. Temperature ratings and spacing limitations are given in the individual certifications.

Multiple-station Type — Multiple-station heat detectors are intended for use in fire alarm systems. They include thermally-sensitive detector units that initiate a signal by releasing compressed gas from a storage cylinder through an alarm mechanism (or horn) to sound an audible signal. These devices are interconnected by tubing.

Both single- and multiple-station units employing compressed gas as the operating mechanism employ a sight glass or visual indicator to check for loss of contents by leakage, tampering or operation.

The individual certifications note the limitations on the maximum length of tubing between the gas storage cylinder, detector units, alarm mechanisms and other system components, and on operating-temperature ratings, spacing limitations (sensitivity), and other details pertinent to the use of these devices.

Ordinarily these devices are intended for locations where normal ceiling temperatures prevail (below 100°F). Locations where temperatures at ceiling are likely to be unduly high, from sources of heat other than fire conditions, such as boiler rooms, demand special consideration. Under these conditions, alarm devices operating normally at higher temperatures and capable of withstanding high temperatures for long periods of time may be required. Care should be exercised to select alarm devices having the proper temperature rating to guard against false alarms from premature operation:

For ceiling temperatures not exceeding 100°F, the 136 to 165°F (ordinary) rating devices are recommended.

For ceiling temperatures exceeding 100°F, but not 150°F, the 174 to 212°F (intermediate) rating devices are recommended.

The spacings specified in the individual certifications are for flat, smooth ceiling construction of ordinary height, generally regarded as the most favorable condition for distribution of heated air currents resulting from a fire. Under other forms of ceiling constructions, reduced spacing of alarm devices may be required.

The placement and spacing of alarm devices should be based on consideration of the ceiling construction, ceiling height, room or space areas, space subdivision, the normal ceiling temperature, possible exposure of the devices to abnormal heat conditions, and to draft conditions likely to be encountered at the time of a fire.

ADDITIONAL INFORMATION

For additional information, see Fire Alarm Devices, Single and Multiple Station, and Accessories (UTER), Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 539, "Single and Multiple Station Heat Alarms."

UL MARK

The Signaling Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and one of the following product names

Single- and Multiple-station Heat Detectors (UTFS)—Continued

as appropriate: “Single Station Heat Detector,” “Multiple-Station Heat Detector,” “Single- and/or Multiple-Station Heat Detector” or “Single- and/or Multiple-Station Heat Detector Accessory.”

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Single- and Multiple-station Smoke Alarms (UTGT)

USE

This category covers single- and multiple-station smoke alarms intended to be employed in indoor locations where sensitivity testing and maintenance of alarms, per section 10.4.4 of ANSI/NFPA 72, “National Fire Alarm Code” (2007), is required by code, Authorities Having Jurisdiction, or other requirement.

This category also covers single- and multiple-station smoke alarms that have been performance tested to a minimum 10-year extended battery life under normal ambient conditions. Unless otherwise noted in the individual certifications, the alarms are intended for flush-mounted installation only, and are not intended for use on surface-mounted boxes.

This category also covers supplementary devices and accessories for use with these units, such as a remote horn. These products are identified in the individual certifications.

ALARM TYPES

Single Station — Self-contained units that incorporate a smoke chamber, an optional heat detector, and related electrical components to initiate an audible alarm signal from the unit when abnormal smoke or heat (when a supplementary heat detector is provided) actuates the unit. These devices may be energized from a commercial power-supply source by means of permanent wiring in accordance with ANSI/NFPA 70, “National Electrical Code,” flexible power-supply cord, use of limited-energy cable or equivalent wiring connected to the output of a suitable Class 2 power supply, or by one or more batteries.

Where a battery is employed as the main supply, its depletion below the level at which an alarm signal would be obtained is indicated by a distinctive audible trouble signal which persists for at least seven days.

Multiple Station — Similar to single-station units but provided with leads or terminals (or integral RF transmitter/receiver units) to permit the interconnection of single-station units so that actuation of any one unit results in actuation of the audible alarms of all units. The installation instructions (manual) indicate the maximum number of units that can be interconnected.

Refer to Chapter 11 of ANSI/NFPA 72 and the instruction manual provided with each smoke alarm for installation data. ANSI/NFPA 72 includes installation requirements of fire warning equipment in family living units. This is intended to cover living areas only and not common usage areas of multifamily buildings such as corridors, lobbies, stairwells, etc.

Travel Alarm — Consists of a battery-operated smoke alarm provided with a mounting bracket for top of door mounting only. May also consist of a battery-operated single-station smoke alarm with the addition of a mounting bracket. The difference is indicated in the UL Certification Mark.

Alarm for Recreational Vehicles — ANSI/UL 217, “Single and Multiple Station Smoke Alarms,” applies, except more stringent environmental tests are conducted.

Alarm for Recreational Boats — ANSI/UL 217 applies, except more stringent environmental tests are conducted.

ADDITIONAL INFORMATION

For additional information, see Fire Alarm Devices, Single and Multiple Station, and Accessories (UTER), Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 217, “Single and Multiple Station Smoke Alarms.”

Products in this category marked “For The Hearing Impaired” have additionally been investigated to ANSI/UL 1971, “Signaling Devices for the Hearing Impaired.”

UL MARK

The Signaling Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word “SIGNALING” above the UL symbol and the word “LISTED” below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and one of the following product names as appropriate:

- “Single-station Smoke Alarm”
- “Multiple-station Smoke Alarm”

Single- and Multiple-station Smoke Alarms (UTGT)—Continued

- “Single- and/or Multiple-station Smoke Alarm”
- “Single- and/or Multiple-station Smoke Alarm Accessory”
- “Travel Smoke Alarm”
- “Single-station Smoke Alarm – Also Suitable as a Travel Smoke Alarm”
- “Single-station Smoke Alarm – Also Suitable for Use in Recreational Vehicles”
- “Single-station Smoke Alarm – Also Suitable for Use in Recreational Boats”
- “Single-station Smoke Alarm Accessory – Also Suitable for Use as a Household Burglary Alarm Unit”
- “Single-station Smoke Alarm – Also Suitable as a Single-station Carbon Monoxide Alarm”
- “Multiple-station Smoke Alarm – Also Suitable as a Multiple-station Carbon Monoxide Alarm”
- “Single- and/or Multiple-station Smoke Alarm – Also Suitable as a Single- and/or Multiple-station Carbon Monoxide Alarm”
- “Single-station Smoke Alarm – Also Suitable as a Commercial Residential Smoke Alarm”
- “Multiple-station Smoke Alarm – Also Suitable as a Commercial Residential Multiple-station Smoke Alarm”

When applicable, the Security Mark is also included. The combined Signaling/Security Listing Mark consists of the Signaling Mark elements detailed above and the word “SECURITY” above the UL symbol. The product name is one of the following:

- “Single-station Smoke Alarm and Household Burglar Alarm Unit”
- “Single- and/or Multiple-station Smoke Alarm Accessory – Also Suitable for Use as a Household Burglar Warning System Control Unit”
- “Single- and/or Multiple-station Smoke Alarm Accessory – Also Suitable for Use as a Household Burglar Warning System Control Unit, Home Health Care Control Unit, and Signal Appliance Control Unit”
- “Single- and/or Multiple-station Smoke Alarm Accessory – Also Suitable for Use as a Household Burglar Warning System Control Unit Accessory, Personal Call Unit, and Signal Appliance Environment Transmitter”
- “Single-station Smoke Alarm Accessory – Also Suitable for Use as a Household Burglary Alarm Unit”
- “Single-station Smoke Alarm Accessory – Also Suitable for Use as a Home Health Care Control Unit”
- “Single-station Smoke and/or Carbon Monoxide Alarm Accessory – Also Suitable for Use as a Home Health Care Control Unit”

Any of the preceding product names may include “for the Hearing Impaired” for products so identified in the individual Listings.

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HEAT-ACTUATED DEVICES FOR SPECIAL APPLICATION (UTHV)

USE AND INSTALLATION

This category covers fixed-temperature, heat-actuated-type detectors employing a special construction different from conventional thermostats and designed to detect an abnormal increase in air temperature.

These detectors are intended to be installed adjacent to the equipment being protected as identified in the installation instructions, and in accordance with the Authority Having Jurisdiction and ANSI/NFPA 70, “National Electrical Code,” or other NFPA Standards that may apply, such as for extinguishing system applications. The temperature rating of the detector should be taken into consideration with regard to installation in the ambient temperature of the equipment to be protected under operating conditions to guard against false alarms. The detectors are intended to be connected to the initiating device circuits of certified control units that provide audible alarm signals or employed as part of an extinguishing system.

Authorities Having Jurisdiction should be consulted before installation.

PRODUCT MARKINGS

Each product is marked to indicate its intended use. This consists of the term “Heat Actuated Device for Special Application,” “Control Unit for Special Application” or “Control Unit Accessory for Special Application.”

ADDITIONAL INFORMATION

For additional information, see Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 521, “Heat Detectors for Fire Protective Signaling Systems.”

UL MARK

Heat-actuated Devices for Special Application
(UTHV)—Continued

The Signaling Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Fire Alarm Equipment" or "Fire Alarm Subassembly."

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

F – Fire Alarm Equipment

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**HOUSEHOLD FIRE-WARNING SYSTEM
UNITS (UTLQ)**

This category covers the individual units that are interconnected to form an electrically-operated household fire-warning system. These units include a main control unit (with integral or separate power supply) and related accessories intended for connection to the control unit.

Additional equipment and materials, such as bells, horns, heat detectors, smoke detectors, and limited-energy fire detector circuit wiring, may be required in various applications to complete a system. Such products are covered under Audible-signal Appliances (ULSZ), Smoke-automatic Fire Detectors (UROX), Heat-automatic Fire Detectors (UQGS) and Fire Alarm Devices, Single and Multiple Station, and Accessories (UTER).

The units comprising a system are intended to be installed in accordance with the applicable requirements of Chapter 2 of ANSI/NFPA 72, "National Fire Alarm Code." Authorities Having Jurisdiction should be notified of the installation.

At least one smoke detector is required to be provided in a household fire-warning system. The smoke detector can be either electrically wired to and operated from the control unit, or be a separately-operated device, such as an electrically-operated single-station fire alarm device.

An installation drawing and/or detailed instructions are employed as the controlling factor to assure proper installation and interconnection among units. This material may be attached to the control unit, provided detached, or included as part of an instruction booklet.

An instruction booklet illustrating typical installation layouts, operation, maintenance, servicing and test procedures is supplied with the main control unit. Printed information for a household emergency evacuation plan may be separate or included as part of the booklet.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**Control Units and Accessories, Household
System Type (UTOU)**

USE AND INSTALLATION

This category covers control units and accessories intended to be used as part of a household fire-warning system.

Control Unit — Consists of a unit assembly of electrical parts having provision for connection of a power supply, signal-actuating devices (thermostats, smoke detectors, switches, etc.), and signal-indicating devices (bells, horns, etc.).

Combination Control Unit — A control unit may additionally include circuit facilities for connection to burglar-alarm devices to form a combination fire-burglary control unit. In such a combination unit the fire-alarm signal takes precedence over the burglar-alarm signal and a distinction between alarm signals is required. A common trouble signal may be employed for both.

Modular Control or Combination Unit — A control unit may be pre-wired at the factory or assembled from readily installed modules. A certified burglary module can be added after the unit is installed to expand the system capability. The installation diagram indicates the type and number of modules that can be employed in a control unit.

PRODUCT MARKINGS

Control Units and Accessories, Household System Type
(UTOU)—Continued

Each product is marked to indicate its intended use. This consists of the term "Household" or "Residential" and the specific use description as indicated in the individual certifications.

ADDITIONAL INFORMATION

For additional information, see Household Fire-warning System Units (UTLQ), Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 985, "Household Fire-Warning System Units."

ADJUNCT SERVICE

UL provides a service for the certification of control units and accessories for use in household fire-warning systems that not only meet the requirements of ANSI/UL 985, but also have been investigated to ANSI/SIA CP-01 (2000, 2007 or 2010), "Control Panel Standard - Features for False Alarm Reduction." See Control Panels, SIA False Alarm Reduction (AMTB).

UL MARK

The Signaling Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Fire Alarm Equipment" or "Fire Alarm Subassembly."

When applicable, the Security Mark is also included. The combined Signaling/Security Listing Mark consists of the Signaling Mark elements detailed above and the word "SECURITY" above the UL symbol. The product name is "Fire Alarm and Security Equipment" or "Fire Alarm and Security Subassembly."

Some of these products are also Listed under other Signaling and Information Technology or Telephone categories. When applicable, the product name may include "and General Signaling," "and Emergency Signaling," "and Information Technology" or "and Telephone," as appropriate (e.g., "Fire Alarm and Telephone Equipment").

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

S – Security Equipment

F – Fire Alarm Equipment

G – General Signaling Equipment

E – Emergency Signaling Equipment

IT – Information Technology Equipment

T – Telephone Equipment

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated to ANSI/SIA CP-01 (2000, 2007 or 2010). The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and one of the following statements as appropriate:

ALSO CLASSIFIED IN ACCORDANCE WITH ANSI/SIA CP-01-2000

ALSO CLASSIFIED IN ACCORDANCE WITH ANSI/SIA CP-01-2007

ALSO CLASSIFIED IN ACCORDANCE WITH ANSI/SIA CP-01-2010

Where model numbers are indicated in the individual Listings, 100% of the manufacturer's production for those models is required to be labeled. Where model numbers are not indicated, the manufacturer is not obliged to label 100% of production.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

POWER-SUPPLY UNITS (UTRZ)

USE

This category covers power-supply units intended for application as components of fire-protective signaling systems.

PRODUCT MARKINGS

Each product is marked to indicate its intended use. This consists of a specific use description as indicated in the individual certifications.

ADDITIONAL INFORMATION

For additional information, see Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1481, "Power Supplies for Fire-Protective Signaling Systems."

UL MARK

Power-supply Units (UTRZ)—Continued

The Signaling Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Fire Alarm Equipment" or "Fire Alarm Subassembly."

The Listing Mark for fire alarm equipment may include the designation "___ of ___." The first space is stamped with the number indicating the position that the panel occupies in the series of panels constituting the fire alarm equipment. The second space is stamped with the total number of units in the fire alarm equipment.

When applicable, the Security Mark is also included. The combined Signaling/Security Listing Mark consists of the Signaling Mark elements detailed above and the word "SECURITY" above the UL symbol. The product name is "Fire Alarm and Security Equipment" or "Fire Alarm and Security Subassembly."

Some of these products are also Listed under other Signaling and Energy Management, Information Technology or Telephone categories. When applicable, the product name may include "and Hospital Signaling and Nurse Call," "and General Signaling," "and Emergency Signaling," "and Enclosed Energy Management," "and Information Technology" or "and Telephone," as appropriate (e.g., "Fire Alarm and Telephone Equipment").

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

- S - Security Equipment
- F - Fire Alarm Equipment
- HN - Hospital Signaling and Nurse Call Equipment
- G - General Signaling Equipment
- E - Emergency Signaling Equipment
- EM - Enclosed Energy Management Equipment
- IT - Information Technology Equipment
- T - Telephone Equipment

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SPEAKERS AND AMPLIFIERS FOR FIRE-PROTECTIVE SIGNALING SYSTEMS (UUMW)

USE AND INSTALLATION

This category covers speakers, amplifiers and their accessories investigated for use in fire alarm and/or emergency communication systems. Speakers have been investigated for audible output of 75dBA or greater measured at 10 ft. when powered from a source of pink noise over a range of 400 - 4000 Hz. The units are marked with a minimum audibility rating.

Accessories, such as enclosures, have been investigated with respect to both mechanical and acoustical consideration when used with speakers specified in the individual certifications.

Where a certified product is formed by the assembly of two or more parts and all parts are not provided as a single package, the specific parts are identified in the individual certifications and each part bears a separate Certification Mark. The marking on each part references installation instructions that show assembly and installation of the parts to form a certified product.

Amplifiers have been investigated with respect to specified input/output parameters in a variety of tests, including harmonic distortion. These products are not to be confused with amplifiers tested as elements of control unit adjunct systems for personnel emergency relocation and evacuation; see Control Unit Accessories, System (UOXX). Amplifiers used in adjunct systems are suitable for use only in specified configurations.

All products covered under this category are intended for indoor use only, unless otherwise specifically identified as suitable for outdoor use by markings on the product and in the individual certifications.

Speakers and/or amplifiers and their accessories that have been investigated for mounting in air-handling spaces are specifically identified by markings on the product and in the individual certifications. Installation details are shown on the product or are provided in a separate installation document provided with the product and referenced in the marking on the product.

PRODUCT MARKINGS

LOOK FOR THE UL MARK ON PRODUCT

Speakers and Amplifiers for Fire-protective Signaling Systems (UUMW)—Continued

Each product is marked to indicate its intended use as indicated in the individual certifications.

ADDITIONAL INFORMATION

For additional information, see Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1480, "Speakers for Fire Protective Signaling Systems," and UL 1711, "Amplifiers for Fire Protective Signaling Systems."

The basic standard used to investigate nonmetallic materials of products marked suitable for use in air-handling spaces in this category is UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces."

UL MARK

The Signaling Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Signaling Listing Mark for these products includes the UL symbol with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the product name "Fire Alarm Equipment" or "Fire Alarm Subassembly."

Some of these products are also Listed under other Signaling categories. When applicable, the product name may include "and General Signaling," as appropriate (e.g., "Fire Alarm and General Signaling Equipment").

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

- F - Fire Alarm Equipment
- G - General Signaling Equipment

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RELEASING DEVICE EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (TBCX)

Releasing Devices with accessory equipment are designed to release operating weights or air or water under pressure in the functioning of fire protection and fire alarm equipment.

They are available in both heat responsive (automatic) and manual types. The heat responsive types may be had in either fixed temperature or rate-of-rise types or a combination of these two.

The heat responsive portions of releasing devices are integral parts of some patterns. In other patterns they are separate parts, such as air chambers which are mounted in the fire area and connected by small-bore tubing to the releasing device; or thermostatically operated electric switches (thermostats) mounted in the fire area and connected by an electric wiring circuit to the releasing device. Devices which have normally open contacts are listed as "Heat-Automatic Fire Detectors" and those which have normally closed contacts are listed as "Heat Detectors for Releasing Device Service."

Proper location and spacing of the auxiliary heat responsive devices (heat detectors, air chambers, tubing, etc.) involve consideration of service conditions throughout the area to be protected - such as ceiling construction, subdivisions of areas (including closets, small rooms, etc.) normal temperatures, high temperatures (if existent), resulting from manufacturing processes or other causes and draft conditions. Because of this, the recommendation regarding spacing of detectors gives a maximum limitation only, and recognizes that specific system settings, abnormal temperature changes, or other field conditions may require downward adjustment of these maximum spacing limits in field installations. Individual Listings should be consulted for details of spacing and locations of the heat responsive devices.

Authorities Having Jurisdiction should be consulted in all cases before installation of systems or devices.

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PRODUCT CATEGORIES BY CATEGORY CODE

RELEASING DEVICE EQUIPMENT FOR USE IN
HAZARDOUS LOCATIONS (TBCX)

HEAT DETECTORS FOR RELEASING DEVICE SERVICE FOR USE IN HAZARDOUS LOCATIONS (TBGR)

GENERAL

This category covers heat detectors having normally closed circuit contacts used for thermo-responsive elements of releasing systems. They are intended to be installed in accordance with ANSI/NFPA 72, "National Fire Alarm Code."

These heat detectors have been investigated for indoor use only unless otherwise indicated in the individual certifications.

The operating principles included in the individual certifications are coded as follows:

- ROR – Rate of rise
- FT – Fixed temperature
- ROR-FT – Combination rate of rise and fixed temperature
- RC – Rate compensation

RELATED PRODUCTS

Heat detectors having normally open contacts are covered under Heat-automatic Fire Detectors for Use in Hazardous Locations (UIRV).

ADDITIONAL INFORMATION

For additional information, see Releasing Device Equipment for Use in Hazardous Locations (TBCX) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Heat Detector for Releasing Device Service for Use in Hazardous Locations."

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RELEASING DEVICES FOR USE IN HAZARDOUS LOCATIONS (TBJW)

GENERAL

This category covers releasing devices intended for use in supporting and releasing loads in connection with automatic operating devices or systems where loads at release lever hook do not exceed those specified in the individual certifications.

This category also covers releasing devices intended for use as a means of releasing air or water under pressure from a piping system confining and conducting that pressure through pipes or tubing to operate any connected pressure-operated mechanism.

A releasing device and its associated detection system may be adjusted to compensate for more or less severe ambient temperature changes by different settings of the release, or by varying the size of the compensating vents in the system to increase or decrease the rate of built-up pressure caused by exposure to some given temperature rise. Because of this, the recommendation regarding spacing of detectors gives a maximum limitation only, and recognizes that specific system settings, abnormal temperature changes, or other field conditions may require downward adjustment of these maximum spacing limits in field installations.

RELATED PRODUCTS

See Heat Detectors for Releasing Device Service for Use in Hazardous Locations (TBGR) and Heat-automatic Fire Detectors for Use in Hazardous Locations (UIRV).

ADDITIONAL INFORMATION

For additional information, see Releasing Device Equipment for Use in Hazardous Locations (TBCX) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 864, "Control Units and Accessories for Fire Alarm Systems."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Ser-

RELEASING DEVICE EQUIPMENT FOR USE IN HAZARDOUS
LOCATIONS (TBCX)

Releasing Devices for Use in Hazardous Locations (TBJW)—Continued

vice. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Releasing Device for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

REPACKAGED ELECTRICAL CONSTRUCTION EQUIPMENT (TEOZ)

GENERAL

This category covers repackaged Listed and Classified electrical construction equipment.

Required user instructions and ratings are marked on or packed with the smallest unit container in which the product is packaged.

Listed wire or cable that has been subjected to processing or respooling subsequent to its manufacture is covered under Processed Wire (ZKLU).

Lightning conductors, air terminals and fittings (see OVTZ) are intended for installation in Listed lightning protection systems and are not eligible for repackaging.

Products under UL's Listed by Report Service may require special descriptions and recommended methods of installation and are not covered under this category.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are referenced in Repackaged Product Program Requirements at www.ul.com

UL MARK

The Listing or Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing or Classification and Follow-Up Service.

The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the appropriate product name.

The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), a control number, the appropriate product name, and information pertaining to the scope of the Classification (e.g., "AS TO ELECTRIC SHOCK AND MECHANICAL INJURY," "IN ACCORDANCE WITH IEEE C37.59").

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ROBOTS AND ROBOTIC EQUIPMENT (TETZ)

GENERAL

This category covers robots, integrated work cells, programmable production equipment, remote sensing equipment, robotic servo power supplies, and similar equipment.

This equipment has been investigated with respect to risks of electric shock, fire and injury to persons.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1740, "Robots and Robotic Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Robot," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ROTARY AUTOMATIC PRODUCT-FILLING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (TONI)

GENERAL

This category covers equipment for automatically filling fluids into aerosol cans, bottles and similar containers.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Rotary Automatic Product Filling Equipment for Hazardous Locations" or "Product Filling Equipment for Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SANITATION, FOOD SERVICE EQUIPMENT (TSQS)

COMMERCIAL COOKING, RETHERMALIZATION AND POWERED HOT-FOOD-HOLDING AND -TRANSPORT EQUIPMENT (TSQT)

USE

This category covers cooking and hot-food-holding equipment, including brewers, steam tables, griddles, broilers, ovens, fryers, food warmers, and similar equipment intended for commercial use.

PRODUCT MARKINGS

Equipment may be marked with use limitations or may provide guidance on intended application.

Rethermalization equipment is provided with a marking that specifies the maximum capacity of the unit.

Equipment provided with a security package for installation in areas where security may be a concern is marked "Intended for use only in environments where security is a concern, such as correctional facilities, mental health facilities, or some schools."

RELATED PRODUCTS

Electric equipment and warming and serving equipment intended for commercial use and investigated to UL Safety Standards is covered under Commercial Cooking Appliances (KNGT) and Custom-built Food Service Equipment (KNNS).

Gas-fired food service equipment is covered under Gas-fired Food Service Equipment (LGQX).

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS).

REQUIREMENTS

The basic standard used to investigate products in this category is NSF/ANSI 4, "Commercial Cooking, Rethermalization and Hot Food Holding and Transport Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification

Commercial Cooking, Rethermalization and Powered Hot-food-holding and -Transport Equipment (TSQT)—Continued

and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

[PRODUCT IDENTITY*]

NSF/ANSI 4

Control No.

* **COOKING EQUIPMENT** or **HOT FOOD STORAGE EQUIPMENT**, or other appropriate product name as shown in the individual Classifications

For those products which are also Listed or Classified by UL under another category, the marking includes the appropriate Listing or Classification Mark, the EPH Mark, and the text "NSF/ANSI 4" below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FOOD EQUIPMENT (TSQU)

USE

This category covers equipment for handling and processing food in food service applications. Products covered include tables, counters, hoods, shelves, cutting boards, wheels, casters, food shields, sinks and utensils intended for commercial use.

This category also covers custom equipment designed and manufactured for a specific installation or application. Specific types of custom equipment are identified in the individual Classifications. They may contain components, design or performance features covered by other applicable NSF standards.

This category does not cover hybrid equipment (e.g., a food transport cabinet with the capability to both heat and refrigerate food) that is not custom equipment. Such equipment is covered by NSF/ANSI 169, "Special Purpose Food Equipment and Devices."

PRODUCT MARKINGS

Equipment provided with a security package for installation in areas where security may be a concern is marked "Intended for use only in environments where security is a concern, such as correctional facilities, mental health facilities, or some schools."

RELATED PRODUCTS

Electric cooking equipment intended for commercial use and investigated to UL Safety Standards is covered under Commercial Cooking Appliances (KNGT) and Custom-built Food Service Equipment (KNNS).

Refrigerators and freezers intended for commercial use and investigated to UL Safety Standards are covered under Commercial Refrigerators and Freezers (SGKW).

Gas-fired food service equipment is covered under Gas-fired Food Service Equipment (LGQX).

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS).

REQUIREMENTS

The basic standard used to investigate products in this category is NSF/ANSI 2, "Food Equipment."

As appropriate, additional requirements for specific design and performance features are obtained from relevant NSF standards. These include but are not limited to:

NSF/ANSI 4, "Commercial Cooking, Rethermalization, and Powered Hot Food Holding and Transport Equipment"

NSF/ANSI 7, "Commercial Refrigerators and Freezers"

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

FABRICATED FOOD SERVICE EQUIPMENT*

NSF/ANSI 2

Control No.

* or other appropriate product name as shown in the individual Classifications (e.g., **HOTEL PAN, CUSTOM COUNTER**)

For those products which are also Listed or Classified by UL under another category, the marking includes the appropriate Listing or Classification Mark, the EPH Mark, and the text "NSF/ANSI 2" below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer

Food Equipment (TSQU)—Continued

turer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMMERCIAL REFRIGERATORS AND STORAGE FREEZERS (TSQV)

GENERAL

This category covers refrigerators and storage freezers, or components for use in these units, intended for commercial use.

Equipment intended solely for storing and/or displaying certain types of products is required to have a permanently attached label indicating what the intended products are. These products include 1) packaged food products, except ice cream and frozen desserts; and 2) nonpotentially hazardous, bottled or canned food and beverage products (e.g., beverage coolers).

Refrigerated buffet units, refrigerated food preparation units, and similar open-top refrigeration equipment is required to have permanent labels indicating that the equipment is intended for use in rooms having an ambient temperature of 30°C (86°F) or less. Display cases, for example, units intended to be installed in the customer service area, and not in the kitchen, that have glass doors only, also have this marking.

Equipment storing potentially hazardous food or beverages (except ice cream and other frozen desserts) including open-top equipment has been subject to performance testing to verify storage temperatures and compressor run time.

Prefabricated walk-in and roll-in refrigerators and storage freezers are not required to be tested. Adequate performance of these units is assured through the proper determination of refrigeration equipment demands.

Unit coolers for installation in walk-in or reach-in refrigerators and storage freezers have been investigated for design, construction and materials only.

PRODUCT MARKINGS

Equipment intended solely for the storage and display of packaged food products (other than self-service display refrigerators or units intended solely for the storage and display of ice cream and other frozen desserts) is marked "This equipment is intended for the storage and display of packaged products only."

Beverage coolers are marked "This equipment is intended for the storage and display of nonpotentially hazardous, bottled or canned products only."

Refrigerated buffet units, refrigerated food preparation units, and similar open-top refrigeration equipment are marked to indicate that the equipment is intended for use in rooms having an ambient temperature of 86°F (30°C) or less.

Type I display refrigerators are marked to indicate that the equipment is intended for use in an area where the environmental conditions are controlled and maintained so that the ambient temperature typically does not exceed 75°F (24°C).

Type II display refrigerators are marked to indicate that the equipment is intended for use in an area where the environmental conditions are controlled and maintained so that the ambient temperature typically does not exceed 80°F (27°C).

Display refrigerators intended solely for the display of foods that are not potentially hazardous are marked "This display refrigerator is not for the display of potentially hazardous foods."

Prefabricated walk-in and roll-in refrigerators and freezers used for the storage of food in the original sealed package are marked "This equipment is intended for the storage of food in the original sealed package only."

RELATED PRODUCTS

Refrigerators and freezers intended for commercial use and investigated to UL Safety Standards are covered under Commercial Refrigerators and Freezers (SGKW).

Unit coolers intended for commercial use and investigated to UL Safety Standards are covered under Unit Coolers (SPLR).

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS).

REQUIREMENTS

The basic standard used to investigate products in this category is NSF/ANSI 7, "Commercial Refrigerators and Storage Freezers."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

[PRODUCT IDENTITY]*

NSF/ANSI 7

Control No.

* COMMERCIAL REFRIGERATOR, COMMERCIAL STORAGE FREEZER, COMMERCIAL REFRIGERATOR AND STORAGE FREEZER, or other appropriate product name as shown in the individual Classification

Commercial Refrigerators and Storage Freezers (TSQV)—Continued

tions. The product name is to be preceded with the text "Component of" when the product covered is not a complete refrigerator or freezer as defined by NSF/ANSI 7.

For those products which are also Listed by UL under Commercial Refrigerators and Freezers (SGKW), the marking includes the appropriate Listing Mark, the EPH Mark, and the text "NSF/ANSI 7" below the EPH Mark.

For those products which are also Listed by UL under Unit Coolers (SPLR), the marking includes the appropriate Listing Mark, the EPH Mark, and the text "NSF/ANSI 7" below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

DOORS AND DOOR-OPERATOR SYSTEMS FOR USE IN MEAT AND POULTRY PLANTS (TSRC)

GENERAL

This category covers doors and door-operator systems Classified with respect to their materials of construction and sanitary design for use in regulated meat and poultry plants.

Authorities Having Jurisdiction should be consulted regarding suitability of this equipment for use in specific applications.

These products have not been investigated for electrical, fire or casualty hazards unless the product also bears UL's Listing Mark of Safety. Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to these hazards.

RELATED PRODUCTS

For doors and door operators investigated to UL Safety Standards, see Door, Drapery, Gate, Louver, and Window Operators and Systems (FDDR).

For food-service equipment investigated for compliance with ANSI/NSF Standards, see Commercial Cooking, Rethermalization and Powered Hot Food Holding and Transport Equipment (TSQT), Food Equipment (TSQU), Commercial Refrigerators and Storage Freezers (TSQV) and Commercial Powered Food Preparation Equipment, Sanitation (DUIA).

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS).

REQUIREMENTS

Doors and door-operator systems are investigated in accordance with the Code of Federal Regulations, 9 CFR, Parts 308 and 381, and the Federal Register, Vol. 62, No. 164, Appendix A, "Guidelines on the Establishment of Facilities and Equipment" (issued August 25, 1997).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

[PRODUCT IDENTITY]*

FOR SANITATION IN ACCORDANCE WITH 9CFR, PARTS 308 AND 381, AND FED. REG. VOL. 62, NO. 164, APPENDIX A (AUGUST 25, 1997)

Control No.

* DOOR, DOOR OPERATOR SYSTEM, DOOR AND DOOR OPERATOR SYSTEM, or other appropriate product name as shown in the individual Classifications

For those products which are also Listed by UL under Door, Drapery, Gate, Louver, and Window Operators and Systems (FDDR), the marking includes the appropriate Listing Mark, the EPH Mark, and the text "For sanitation in accordance with 9CFR, Parts 308 and 381, and Fed. Reg. Vol. 62, No. 164, Appendix A (August 25, 1997)" in close proximity to the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FREEZERS, DISPENSING (TSRE)

USE

This category covers dispensing freezers intended for commercial use. The types of freezers include:

1. Dispensing freezers that process and freeze previously pasteurized

Freezers, Dispensing (TSRE)—Continued

product, such as soft ice cream, yogurt and custard, then dispense that product directly into a consumer's container

2. Dispensing freezers that dispense premanufactured frozen product, such as ice cream, directly into a consumer's container
3. Batch-dispensing freezers

PRODUCT MARKINGS

Each dispensing freezer is marked with the manufacturer's recommended cleaning and sanitizing procedures.

Batch-dispensing freezers are not designed for product storage and are marked that a single batch of product should not remain in the unit for longer than one hour.

RELATED PRODUCTS

Dispensing freezers intended for commercial use and investigated to UL Safety Standards are covered under Ice Cream Makers (SINX).

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS).

REQUIREMENTS

The basic standard used to investigate products in this category is NSF/ANSI 6, "Dispensing Freezers."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

DISPENSING FREEZER*

NSF/ANSI 6
Control No.

* or other appropriate product name as shown in the individual Classifications

For those products which are also Listed by UL under Ice Cream Makers (SINX), the marking includes the appropriate Listing Mark, the EPH Mark, and the text "NSF/ANSI 6" below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ICE-MAKING EQUIPMENT, AUTOMATIC (TSVG)

USE

This category covers automatic ice makers intended for commercial use. This category also covers commercial equipment used to process, convey, dispense and hold ice.

PRODUCT MARKINGS

Automatic ice-making equipment is marked with the manufacturer's recommended cleaning and sanitization procedures.

RELATED PRODUCTS

Ice makers intended for commercial use and investigated to UL Safety Standards are covered under Ice Makers (SJBV).

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is NSF/ANSI 12, "Automatic Ice Making Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

AUTOMATIC ICE MAKER*

NSF/ANSI 12
Control No.

* or other appropriate product name as shown in the individual Classifications

For those products which are also Listed by UL under Ice Makers (SJBV), the marking includes the appropriate Listing Mark, the EPH Mark, and the text "NSF/ANSI 12" below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Ice-making Equipment, Automatic (TSVG)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FOOD- AND BEVERAGE-DISPENSING EQUIPMENT, MANUAL (TSXL)

GENERAL

This category covers equipment and/or devices intended for commercial use that dispense food or beverages in bulk or portions. Equipment directly connected to the potable water supply is intended to comply with local plumbing codes.

This category does not cover vending machines, dispensing freezers, bulk milk-dispensing equipment, beer taps (valves) or coffee urns.

PRODUCT MARKINGS

Dispensing equipment designed without temperature-controlled storage of potentially hazardous foods or beverages is marked "This machine is designed only for use with a specific product and container combination. The use of a product and container combination not recommended by the manufacturer may result in consumer illness." In addition, it identifies the product and container combinations for which the equipment is approved, or directs the operator to consult the manufacturer of the equipment for appropriate product and container combinations.

RELATED PRODUCTS

Beverage coolers and beverage-cooler dispensers are covered under Beverage Coolers and Beverage-Cooler Dispensers (SFWY).

Coffee machines investigated to sanitation requirements are covered under Commercial Cooking, Rethermalization and Powered Hot Food Holding and Transport Equipment (TSQT).

Coffee urns investigated to sanitation requirements are covered under Food Equipment (TSQU).

Commercial bulk milk-dispensing equipment investigated to sanitation requirements is covered under Milk-dispensing Equipment, Commercial, Bulk (TSXQ).

Vending machines for food and beverages investigated to sanitation requirements are covered under Vending Machines for Food and Beverages (TSYA).

Valves, beer taps, and other special beverage-dispensing devices investigated to sanitation requirements are covered under Special Purpose Food Equipment and Devices, Sanitation (VCZU).

Vending machines are covered under Vending Machines (YW XV).

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is NSF/ANSI 18, "Manual Food and Beverage Dispensing Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

MANUAL DISPENSING EQUIPMENT*

NSF/ANSI 18
Control No.

* or other appropriate product name as shown in the individual Classifications

For those products which are also Listed or Classified by UL under another category, the marking includes the appropriate Listing or Classification Mark, the EPH Mark, and the text "NSF/ANSI 18" below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MILK-DISPENSING EQUIPMENT, BULK, COMMERCIAL (TSXQ)

GENERAL

This category covers bulk-milk-dispensing equipment, dispensing servings of milk or milk products by manual or machine actuation, intended for commercial use.

Milk-dispensing Equipment, Bulk, Commercial (TSXQ)—Continued

This category does not cover dispensing freezers, vending machines or manual food- and beverage-dispensing devices. Bulk-milk dispensers are marked to indicate that the equipment is intended for use in rooms having an ambient temperature of 86°F (30°C) or less.

RELATED PRODUCTS

Beverage coolers and dispensers intended for commercial use and investigated to UL Safety Standards are covered under Beverage Coolers and Beverage Cooler-Dispensers (SFWY).

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS).

REQUIREMENTS

The basic standard used to investigate products in this category is NSF/ANSI 20, "Commercial Bulk Milk Dispensing Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

COMMERCIAL BULK-MILK-DISPENSING EQUIPMENT*
NSF/ANSI 20
Control No.

* or other appropriate product name as shown in the individual Classifications

For those products which are also Listed by UL under Beverage Coolers and Beverage Cooler-Dispensers (SFWY), the marking includes the appropriate Listing Mark, the EPH Mark, and the text "NSF/ANSI 20" below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AIR CURTAINS FOR USE IN COMMERCIAL FOOD-SERVICE ENTRANCEWAYS (TSXT)

USE

This category covers air curtains intended for use over service and customer entryways and windows in commercial food-service establishments.

PRODUCT MARKINGS

These air curtains are provided with the manufacturer's instructions specifying the maximum design width and height of the opening to be protected.

RELATED PRODUCTS

Nonheating-type electric air-curtain fans intended for commercial use and investigated to UL Safety Standards are covered under Fans, Electric (GPWW); heating-type electric air-curtain fans are covered under Air Heaters, Room, Fixed and Location-dedicated (KKWS).

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS).

REQUIREMENTS

The basic standard used to investigate products in this category is NSF/ANSI 37, "Air Curtains for Entranceways in Food and Food Service Establishments."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

AIR CURTAIN
FOR USE IN COMMERCIAL FOOD SERVICE ENTRANCEWAYS*
NSF/ANSI 37
Control No.

* or other appropriate product name as shown in the individual Classifications

For those products which are also Listed or Classified by UL under another category, the marking includes the appropriate Listing or Classification Mark, the EPH Mark, and the text "NSF/ANSI 37" below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

Air Curtains for Use in Commercial Food-service Entranceways (TSXT)—Continued

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

RESIDENTIAL DISHWASHERS (TSXU)

USE AND INSTALLATION

This category covers dishwashers intended for residential use. A residential dishwasher is designed and constructed to wash and sanitize dishes by means of a spray wash and a sanitizing rinse. It is intended for use in a private home or other location that is not a food establishment as defined by Section 1.201-10 of the United States FDA Food Code.

Each dishwasher is provided with a means to indicate that the sanitization cycle has been successfully completed when sanitization is selected.

Authorities Having Jurisdiction should be consulted with respect to requirements for connection to water supply and waste disposal lines.

PRODUCT MARKINGS

Residential dishwashers are marked "Certified residential dishwashers are not intended for licensed food establishments."

RELATED PRODUCTS

For dishwashers intended for residential use investigated to UL Safety Standards, see Dishwashers, Household (DM1Y); for dishwashers intended for commercial use, see Commercial Warewashing Equipment (TSXV).

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

These products have been investigated for public health and sanitation requirements in accordance with NSF/ANSI 184, "Residential Equipment - Residential Dishwashers."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

RESIDENTIAL DISHWASHER
NSF/ANSI 184
Control No.

For those products which are also Listed or Classified by UL under another category, the marking includes the appropriate Listing or Classification Mark, the EPH Mark, and the text "NSF/ANSI 184" below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COMMERCIAL WAREWASHING EQUIPMENT (TSXV)
GENERAL

This category covers stationary rack- and conveyor-type warewashing equipment intended for commercial use. Typical ware includes dishes, glasses, pots, pans and utensils. Cleaning is accomplished by spray of detergent solutions and water, with sanitizing effected through exposure to hot water and/or chemical sanitizing solutions.

RELATED PRODUCTS

For electric, steam and gas-fired dishwashers and glasswashers intended for commercial use investigated to UL Safety Standards, see Dishwashers, Commercial (DMGR).

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

These products have been investigated for sanitation requirements in accordance with NSF/ANSI 3, "Commercial Warewashing Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

COMMERCIAL WAREWASHING EQUIPMENT*
NSF/ANSI 3
Control No.

* or other appropriate product name as shown in the individual Classifications

Commercial Warewashing Equipment (TSXV)—Continued

For those products which are also Listed or Classified by UL under another category, the marking includes the appropriate Listing or Classification Mark, the EPH Mark, and the text “NSF/ANSI 3” below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SHATTER CONTAINMENT OF LAMPS FOR USE IN REGULATED FOOD ESTABLISHMENTS (TSXX)

USE

This category covers shatter protection and protected lamps intended for use in food applications to reduce the risk of adulteration of food caused by broken glass. These products are Classified for design and construction characteristics relating to sanitation and performance of the shatter-protection means.

The types of shatter protection covered under this category include shields, guards, globes, tubes and sleeves. Also covered are integrally-protected lamps employing coatings applied directly to the lamp.

This category does not cover luminaires (lighting fixtures), lampholders or other apparatus that support the lamps and/or shatter-containment mechanism.

The breakage of lamps in food establishments, including processing environments and retail facilities, can present a risk of adulteration to exposed food. Protection against adulteration is addressed in 21CFR110, “Current Good Manufacturing Practice in Manufacturing, Packing, or Holding Human Food,” and the U.S. FDA Food Code, Chapter 6, Subpart 6-202.11, “Light Bulbs, Protective Shielding.”

Lamps are fragile and can break regardless of the precautions taken to avoid this, including use of a shatter-containment system. Therefore the performance of the containment systems under use conditions is only investigated to determine whether the risk of food adulteration is mitigated when such systems are installed and used as intended. Producers are then able to demonstrate performance under use conditions and provide uniform guidance to facility operators and personnel on the intended applications for the shatter-containment system.

These lamps are Classified for use in three types of environments: general use, high temperature and low temperature. General use correlates with facility lighting. Low-temperature lamps are conditioned at water-freezing temperatures, while high-temperature lamps are conditioned at temperatures representative for commercial cooking applications.

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2007A, “Outline of Investigation for Shatter Containment of Lamps for Use in Regulated Food Establishments.”

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

LAMP*
AS TO + ONLY
Control No.

* or other appropriate product name as shown in the individual Classifications

+ **SHATTER CONTAINMENT** or **SHATTER PROTECTION**

For those products which are also Listed or Classified by UL under another category, the marking includes the appropriate Listing or Classification Mark, the EPH Mark, and the text “AS TO + ONLY” below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

VENDING MACHINES FOR FOOD AND BEVERAGES (TSYA)

GENERAL

This category covers food and beverage vending machines that dispense unit servings of food or beverages, in bulk or in packages, upon insertion of a coin, paper currency, token, card, key or by manual operation. These machines are intended for commercial use.

RELATED PRODUCTS

For vending machines intended for commercial use investigated to UL Safety Standards, see Vending Machines (YWXV) and Vending Machines, Refrigerated (SQMX).

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is NSF/ANSI 25, “Vending Machines for Food and Beverages.”

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

VENDING MACHINE FOR FOOD AND BEVERAGES*
NSF/ANSI 25
Control No.

* or other appropriate product name as shown in the individual Classifications

For those products which are also Listed by UL under Vending Machines (YWXV) or Vending Machines, Refrigerated (SQMX), the marking includes the appropriate Listing Mark, the EPH Mark, and the text “NSF/ANSI 25” below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WATER HEATERS, HOT-WATER-SUPPLY BOILERS AND HEAT-RECOVERY EQUIPMENT (TSYO)

GENERAL

This category covers commercial water heaters and hot water supply boilers operated by electricity, gas and/or oil, and heat recovery equipment. The equipment provides hot water for washing, sanitizing and other purposes in food service applications. It is intended that the manufacturer provide instructions for installation, operation and maintenance of the equipment. For those units with recirculation systems supplied by the manufacturer, it is intended that the manufacturer provide guidelines for the acceptable method(s) of installation and recirculation.

This category does not cover boilers used for space heating.

RELATED PRODUCTS

For electrically-operated equipment investigated to UL Safety Standards, see the following categories:

Commercial Storage Tank and Booster Water Heaters (KSBZ)
Miscellaneous Water Heaters (KSGR)
Boilers, Electric (BDJS)

For gas-fired and/or oil-fired equipment investigated to UL Safety Standards, see the following categories:

Gas-fired Water Heaters, Commercial-Industrial (LUYW)
Gas-Oil-fired Water Heaters (LVCQ)
Oil-fired Water Heaters (LVFV)
Gas-fired Boiler Assemblies (KVTR)
Gas-Oil-fired Boiler Assemblies (KWGZ)
Oil-fired Boiler Assemblies (KWUX)
Waste-heat Recovery Boiler Assemblies (KXFJ)

ADDITIONAL INFORMATION

For additional information, see Food Safety and Quality, Products and Equipment (AAFS) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is NSF/ANSI 5, “Water Heaters, Hot Water Supply Boilers, and Heat Recovery Equipment.”

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

Water Heaters, Hot-water-supply Boilers and Heat-recovery Equipment (TSYO)—Continued**WATER HEATER*
NSF/ANSI 5
Control No.**

* or other appropriate product name as shown in the individual Classifications

For those products which are also Listed or Classified by UL under another category, the marking includes the appropriate Listing or Classification Mark, the EPH Mark, and the text "NSF/ANSI 5" below the EPH Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SEMICONDUCTOR MANUFACTURING EQUIPMENT (TWKH)**USE**

This category covers equipment and accessories used in the manufacturing, metrology, assembly and testing of semiconductor products. Equipment intended for both semiconductor-product-related use and non-semiconductor-product-related use may be covered under this category, as well as in the applicable non-semiconductor categories. These products do not include equipment intended only for non-semiconductor-product-related use.

FACTORS NOT INVESTIGATED

The accuracy or quality characteristics of any measured, analyzed or prepared quantities have not been investigated. The sound-pressure levels and physiological effects of the radio frequency have not been investigated.

REQUIREMENTS

This equipment has only been investigated for use in unclassified locations as defined in ANSI/NFPA 70, "National Electrical Code" (NEC). Equipment that has been investigated to determine its suitability for use in hazardous (classified) locations as defined in the NEC may be found in the Hazardous Locations Equipment Directory.

This equipment may also have been investigated to SEMI®S2-XX, "Safety Guidelines for Semiconductor Manufacturing Equipment," where "XX" is the edition date. Such equipment bears the marking, "Design evaluated by UL in accordance with Safety Guidelines for Semiconductor Manufacturing Equipment, SEMI® S2-XX. See accompanying report for details." This marking is located adjacent to the UL Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AUTOMATION AND WAFER-HANDLING EQUIPMENT (TWPV)**GENERAL**

This category covers automated production equipment, remote sensing equipment, robotic servo power supplies, wafer-handling equipment and the like. Equipment covered under this category includes, but is not limited to, equipment involving:

- Wafer Sorters
- Front Opening Universal Ports (FOUP)
- Wafer Transport Systems
- Wafer Loaders
- Standard Mechanical Interfacers (SMIF)
- Other Handling and Transfer Equipment

RELATED PRODUCTS

For apparatus designated as robotic equipment, see Robots and Robotic Equipment (TETZ).

ADDITIONAL INFORMATION

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2011, "Outline of Investigation for Factory Automation Equipment," or UL 3121-1, "Process Control Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Ser-

Automation and Wafer-handling Equipment (TWPV)—Continued

vice. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the category identifier "Semiconductor Manufacturing Equip" or "TWPV." The Listing Mark may also include the appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CONTROL PANELS (TWRP)**USE**

The category covers control panels and equipment used to provide power and control to semiconductor process equipment. The Certification Mark for these products covers both the enclosure and the panel provided with it. The panels may be provided with RF power supplies, DC power supplies, control transformers, motor controllers, overload devices, contactors, a main disconnect device and emergency power off (EPO). Semiconductor manufacturing equipment control panels have been certified only as to electrical fire and shock hazards incident to their use in ordinary locations. The compatibility of the panel with the controlled equipment from the standpoint of other potential hazards has not been investigated.

Control panels are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

RELATED PRODUCTS

For industrial control panels for general use, see Industrial Control Panels (NITW) and Industrial Control Equipment (NIMX).

ADDITIONAL INFORMATION

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 508A, "Industrial Control Panels." In addition, the following applicable requirements from SEMI S2-XX are applied, where XX is the issue date of SEMI S2: Safety-related Interlocks, Electrical, Emergency Shutdown, Hazard Warnings, Ergonomics, Seismic, and Documentation.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT NAME*]

AS TO FIRE AND ELECTRIC SHOCK ONLY

Control No.

* CONTROL PANEL FOR SEMICONDUCTOR MANUFACTURING EQUIPMENT or SEMICONDUCTOR MANUFACTURING EQUIPMENT CONTROL PANEL

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LIQUID-CHEMICAL DISTRIBUTION SYSTEMS (TWSP)**GENERAL**

This category covers equipment designed for activities involving control of liquid chemicals used in wafer processing, such as mixing, dispensing, and waste management.

These units may include a complete distribution system consisting of pumps, liquid-chemical-containing components (e.g. tubing), and associated electrical controls, or modules of such a system.

This equipment is limited to the use of nonflammable liquids. Semiconductor process chemicals present certain inherent hazards. Such inherent hazards, such as toxicity, have not been investigated. The instructions and warnings supplied with and applicable to each piece of equipment should be carefully observed.

The liquid-chemical pumps used in this equipment may be individually covered under Power-operated Chemical Pumps (RBOG) and are intended for liquid transfer or loop systems. Limitations of use, including chemical service and pressure and temperature ratings, are indicated in the individual certifications and are marked on the pump.

SEMICONDUCTOR MANUFACTURING EQUIPMENT (TWKH)

Liquid-chemical Distribution Systems (TWSP)—Continued

This equipment is marked with the following information: "For *, ____ psi max, ____ °F," where "*" is the name of the chemical.

ADDITIONAL INFORMATION

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 3121-1, "Process Control Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the category identifier "Semiconductor Manufacturing Equip" or "TWSP." The Listing Mark may also include the appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MISCELLANEOUS SEMICONDUCTOR MANUFACTURING EQUIPMENT (TWTZ)**GENERAL**

This category covers miscellaneous semiconductor manufacturing equipment including, but not limited to, equipment involving commercial processing water chillers, cryogenic refrigeration systems, cryopumps and compressors, heat exchangers, recirculators, turbo molecular pumps, and water heaters.

USE

Water chillers, heaters, heat exchangers and recirculators are intended for cooling and tempering water used in semiconductor processing system (PVD, CVD, Etcher, etc.). These units may be provided with a complete refrigeration system (consisting of a hermetic motor-compressor, condenser, evaporator, refrigerant control, electrical controls, wiring and associated refrigerant-containing components including tubing) and associated electrical controls, and may also incorporate means for heating and circulating water.

Vacuum pumps/accessories, turbo molecular pumps, cryopumps and compressors are intended for use on nominal system voltages of 600 V or less, except for equipment driven by an electromagnetic mechanism, which is for use on nominal system voltages of 250 V or less.

SUPPLY CONNECTIONS

These appliances are cord-connected or provided with means for field wiring connections.

SPECIAL INSTRUCTIONS

For equipment with refrigeration systems, documentation (instructions and warnings) supplied with the equipment identifies the investigated refrigerants.

ADDITIONAL INFORMATION

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are:

Equipment containing refrigeration systems or components thereof are investigated to UL 61010A-1, "Electrical Equipment for Laboratory Use; Part 1: General Requirements," ANSI/UL 471, "Commercial Refrigerators and Freezers", and ANSI/UL 1995, "Heating and Cooling Equipment".

Heat exchangers and water heaters are investigated to UL 61010A-1 and UL 1995.

Equipment containing air compressors or vacuum pumps are investigated to UL 61010A-1 and UL 1450, "Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment."

Other miscellaneous equipment is investigated to the standards indicated in the individual certifications covering the equipment.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the category identifier "Semiconductor Manufacturing Equip" or "TWTZ." The Listing Mark may also include the appropriate product name as shown in the individual Listings.

SEMICONDUCTOR MANUFACTURING EQUIPMENT (TWKH) 403

Miscellaneous Semiconductor Manufacturing Equipment (TWTZ)—Continued

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PROCESS EQUIPMENT (TWWT)**GENERAL**

This category covers semiconductor process equipment, process management equipment, and process signaling equipment. Equipment covered under this category includes, but is not limited to, equipment involving:

Chemical Mechanical Planarization (CMP)
Chemical Vapor Deposition (CVD)
Dry Etching
Epitaxy
Ion Implantation
Liquid Heating
Lithography
Photomasking
Physical Vapor Deposition (PVD)
Spin/Rinse Drying
Vacuum Deposition (Evaporation/Sputtering)
Wet Etching
Scrubbers

This equipment may use liquid chemicals to complete a process. Equipment that does not utilize liquid chemicals for a process (i.e., serves only to distribute, store, or prepare the liquid chemicals) is covered under Liquid Chemical Distribution System Equipment (TWSP). Process equipment has been certified only as to fire and electric shock hazards incident to their use. The chemical hazards associated with this equipment (e.g., compatibility, inhalation, ingestion, contact) have not been investigated.

ADDITIONAL INFORMATION

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 3121-1, "Process Control Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[CATEGORY IDENTIFIER*]**AS TO FIRE AND ELECTRIC SHOCK ONLY****Control No.***** SEMICONDUCTOR MANUFACTURING EQUIP or TWWT**

The Classification Mark may also include the appropriate product name as shown in the individual Classifications

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SEMICONDUCTOR MANUFACTURING EQUIPMENT, LIMITED PRODUCTION (TWWU)**USE**

This category covers equipment and accessories that are of limited production. Equipment bearing the limited-production Certification Mark is not under routine Follow-Up Service.

This equipment has been certified only as to electrical fire and shock hazards incident to its use in unclassified locations.

ADDITIONAL INFORMATION

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 508, "Industrial Control Equipment," and ANSI/NFPA 79, "Electrical Standard for Industrial Machinery," in addition to the requirements contained in UL Subject 2011, "Outline of Investigation for Factory Automation Equipment."

404 SEMICONDUCTOR MANUFACTURING EQUIPMENT (TWKH)

Semiconductor Manufacturing Equipment, Limited Production (TWWU)—Continued

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

LIMITED-PRODUCTION SEMICONDUCTOR MANUFACTURING EQUIPMENT
AS TO ELECTRICAL FIRE AND SHOCK HAZARDS ONLY
Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SERVICE CABLE (TXKT)

SERVICE-ENTRANCE CABLE (TYLZ)

GENERAL

This category covers service-entrance cable designated Type SE and Type USE for use in accordance with Article 338 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Service-entrance cable, rated 600 V, is certified in sizes 14 AWG and larger for copper, and 12 AWG and larger for aluminum or copper-clad aluminum. The cable is designated as follows:

Type SE — Indicates cable for aboveground installation. Both the individual insulated conductors and the outer jacket or finish of Type SE are suitable for use where exposed to sun. Type SE cable contains Type RHW, RHW-2, XHHW, XHHW-2, THWN or THWN-2 conductors. Maximum size is 4/0 AWG copper or 300 kcmil aluminum or copper-clad aluminum.

Types USE and USE-2 — Indicates cable for underground installation including direct burial in the earth. Maximum size is 2000 kcmil. Cable in sizes 4/0 AWG copper, aluminum or copper-clad aluminum and smaller and having all conductors insulated is suitable for all of the underground uses for which Type UF cable is permitted by the NEC. Multiconductor Type USE cable contains conductors with insulation equivalent to RHW or XHHW. Multiconductor Type USE-2 contains insulation equivalent to RHW-2 or XHHW-2 and is rated 90°C wet or dry. Single- and multiconductor Types USE and USE-2 are not suitable for use in premises. Single- and multiconductor Types USE and USE-2 are not suitable aboveground except to terminate at the service equipment or metering equipment. Both the insulation and the outer covering, when used, on single- and multiconductor Types USE and USE-2, are suitable for use where exposed to sun.

Submersible Water Pump Cable — Indicates a multiconductor cable in which 2, 3 or 4 single-conductor Type USE or USE-2 cables are provided in a flat or twisted assembly. The cable is certified in sizes 14 AWG to 4/0 AWG inclusive, copper, and 12 AWG to 4/0 AWG inclusive, aluminum or copper-clad aluminum. The cable is tag marked "For use within the well casing for wiring deep-well water pumps where the cable is not subject to repetitive handling caused by frequent servicing of the pump units." The insulation may also be surface marked "Pump Cable." The cable may be directly buried in the earth in conjunction with this use.

For termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

Based upon tests which have been made involving the maximum heating that can be produced, an uninsulated conductor employed in a service cable assembly is considered to have the same current-carrying capacity as the insulated conductors even though it may be smaller in size.

PRODUCT MARKINGS

The Type designation of the conductors may be marked on the surface of the cable. When used, this marking indicates that the temperature rating for the cable corresponds to the temperature rating of the conductors. When this marking does not appear, the temperature rating of the cable is 75°C.

Cable acceptable for installation in cable trays is so marked.

Cable may employ copper, aluminum, or copper-clad aluminum conductors. Cable with copper-clad aluminum conductors is surface printed "AL (CU-CLAD)" or "Cu-Clad Al." Cable with aluminum conductors is surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel) by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

SERVICE CABLE (TXKT)

Service-entrance Cable (TYLZ)—Continued

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 854, "Service-Entrance Cables."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Service-entrance cable that contains copper or copper-clad aluminum conductor(s) has the product name "Service-Entrance Cable"; service-entrance cable that contains aluminum conductors has the product name "Aluminum Service-Entrance Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Service-entrance Cable Fittings (TYZX)

GENERAL

This category covers service-entrance-cable connectors and service-entrance heads or hoods suitable for use with service-entrance cable. This cable is intended for installation and use in accordance with the following information.

The individual certifications for each connector used with nonmetallic-sheathed cable may have details about the size and number of the nonmetallic-sheathed cable it will secure.

All male threaded fittings have only been investigated for use with lock-nuts.

Service-entrance heads or hoods are intended to be used on service-entrance cable that is mounted in a vertical position. Service-entrance heads or hoods are suitable for outdoor use and in wet locations.

Reusability — Fittings have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction.

MARKINGS

Some connectors are also acceptable for use with flexible cord, flexible nonmetallic tubing or nonmetallic-sheathed cable as indicated on the device or carton. Connectors for use with nonmetallic-sheathed cable are also suitable for use with multiconductor underground feeder and branch-circuit cable where used in dry locations. Unless marked otherwise on the carton, the connectors are suitable for connection of only one cable per cable entry.

Rubber and neoprene gland-type fittings suitable for wet locations are identified by a "Wet Location" marking on the carton.

Fittings are marked on the carton with the cable range sizes for which the fitting is intended to be used.

RELATED PRODUCTS

Fittings covered under Power and Control Tray Cable Connectors (QPOZ), Nonmetallic-sheathed Cable Connectors (PXJV), Conduit Fittings (DWTT) and Armored Cable Connectors (AWSX) are also suitable for use with service-entrance cable when specifically indicated on the device or carton.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Service Entrance Cable Fitting," "Connector" or "Service Entrance Head," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SHIPBOARD CABLE, MARINE (UBVZ)

USE AND INSTALLATION

This category covers cable for installation and use aboard marine vessels, fixed and floating offshore petroleum facilities and mobile offshore drilling units (MODUs) in accordance with United States Coast Guard Electrical Engineering Regulation 46CFR111.60, "Wiring Materials and Methods." This cable has not been investigated for use in accordance with ANSI/NFPA 70, "National Electrical Code."

The cable covered under this category is distribution cable rated 600 V, 1 kV, 2 kV or 5 kV, 5–35 kV shielded, control cable rated 600 V, 1 kV, and signal and instrumentation cable rated 300 V.

PRODUCT MARKINGS

Cable is surface marked with temperature and voltage rating and the cable Type designation.

Cable surface marked with a low-temperature rating complies with low-temperature bending and low-temperature impact tests.

Cable surface marked "FT4" complies with the requirements of the CSA FT4 Flame Test.

Cable that has a continuous corrugated aluminum armor is identified by the marking "CWCMC" in addition to the cable Type designation.

ADDITIONAL INFORMATION

For additional information, see Marine Products (AAMP) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1309, "Marine Shipboard Cable."

Listed cable that is additionally marked "ALSO CLASSIFIED IN ACCORDANCE WITH IEEE 1580-2001" complies with the construction and performance requirements of that international standard.

Listed cable that is additionally marked "ALSO CLASSIFIED IN ACCORDANCE WITH IEEE 45-1998" complies with the construction and performance requirements of that international standard.

Listed cable that is additionally marked "ALSO CLASSIFIED IN ACCORDANCE WITH IEC 60092 Part No. [specify appropriate Part No.]" complies with the construction and performance requirements of that international standard.

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Marine Shipboard Cable."

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with IEEE 1580-2001, IEEE 45-1998, or IEC 60092 Part No. 350, 353, 354, 373, 374, 375 and/or 376. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and "ALSO CLASSIFIED IN ACCORDANCE WITH [Specification name and number]."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SHIPBOARD CABLE FITTINGS, MARINE (UBWE)

USE AND INSTALLATION

This category covers fittings intended for use with marine shipboard cable with and without metal wire armor and with and without nonmetallic jacket over the metal wire armor. No splices of conductors are intended to be made in the fittings. Restrictions on application, position, and/or location of the fittings are indicated in the manufacturer's instructions.

All male threaded fittings have only been investigated for use with lock-nuts.

These fittings are intended for use on mobile offshore oil rigs and drilling platforms. Investigations of these fittings include an evaluation for conformity to the installation and use provisions of United States Coast Guard Electrical Engineering Regulation 46CFR111.60, "Wiring Materials and Methods," as applied by the Authority Having Jurisdiction.

Reusability — Fittings have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction.

ADDITIONAL INFORMATION

For additional information, see Shipboard Cable, Marine (UBVZ), Marine Products (AAMP) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Shipboard Cable Fittings, Marine (UBWE)—Continued

The basic standard used to investigate products in this category is ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings."

UL MARK

The UL symbol on the product and the Marine Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Marine Listing Mark for these products includes the UL symbol with the word "MARINE" above the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Shipboard Cable Fitting," or other appropriate product name as shown in the individual Listings.

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SHIPBOARD CABLE, MARINE, CLASSIFIED IN ACCORDANCE WITH INTERNATIONAL SPECIFICATIONS (UBWK)

GENERAL

This category covers marine shipboard cable whose construction and performance characteristics have been determined by UL to be in accordance with one or more of the following standards:

- IEEE 45 (1998), "IEEE Recommended Practice for Electric Installations on Shipboard"
- IEEE 1580 (2001), "IEEE Recommended Practice for Marine Cable for Use on Shipboard and Fixed or Floating Platforms"
- IEC 60092-350, "Electrical Installations in Ships – Part 350: Shipboard Power Cables - General Construction and Test Requirements"
- IEC 60092-353, "Electrical Installations in Ships – Part 353: Single and Multicore Non-Radial Field Power Cables with Extruded Solid Insulation for Rated Voltages 1 kV and 3 kV"
- IEC 60092-354, "Electrical Installations in Ships – Part 354: Single- and Three-Core Power Cables with Extruded Solid Insulation for Rated Voltages 6 kV, 10 kV and 15 kV"
- IEC 60092-373, "Shipboard Telecommunication Cables and Radio-Frequency Cables Shipboard Flexible Coaxial Cables"
- IEC 60092-374, "Shipboard Telecommunication Cables and Radio-Frequency Cables Telephone Cables for Non-Essential Communication Services"
- IEC 60092-375, "Shipboard Telecommunication Cables and Radio-Frequency Cables General Instrumentation, Control and Communication Cables"
- IEC 60092-376, "Electrical Installations in Ships Part 376: Shipboard Multicore Cables for Control Circuits"

This cable has not been investigated for use in accordance with ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Marine Products (AAMP).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

MARINE SHIPBOARD CABLE IN ACCORDANCE WITH [appropriate Specification name and number as noted above] No.

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SIGNAL APPLIANCES (UCEV)

This category covers equipment intended for general utility signaling, such as paging and intercommunication, and has been investigated only with regard to electrical fire and accident hazard.

AUDIBLE-SIGNAL APPLIANCES, GENERAL SIGNAL (UCST)

GENERAL

This category covers electrically operated bells, buzzers, horns and similar signal-sounding appliances intended for general signaling only. These devices may differ from audible-signal appliances intended for fire-protective signaling service in construction, and are not required to be marked with an audibility rating.

PRODUCT MARKINGS

Each product is marked to indicate its intended use. This consists of the term "Audible Signal Appliance for General Signaling (Nonfire-Alarm) Use" or "Audible Signal Appliance Subassembly for General Signaling (Nonfire-Alarm) Use."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 464, "Audible Signal Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "General Signaling Equipment" or "General Signaling Subassembly."

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

G - General Signaling Equipment

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SIGNAL SYSTEM UNITS (UDTZ)

USE

This category covers units intended to be used in combinations with related certified equipment to form installed systems for general-utility signaling purposes. The units have been investigated only for hazard of fire and electric shock and are not associated with property protection and/or life safety. The general-purpose signaling nature of each product is categorized as Type NM (Nonmonitored).

PRODUCT MARKINGS

Each product is marked to indicate its intended use. This consists of the phrase "Type NM" and a the specific use description as indicated in the individual certifications.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2017, "General-Purpose Signaling Devices and Systems."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "General Signaling Equipment" or "General Signaling Subassembly."

Some of these products are also Listed under other Signaling categories. When applicable, the Signaling Mark is also included. The Signaling Mark consists of the Listing Mark elements detailed above, with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL symbol. When applicable, the product name may include "and Hospital Signaling and Nurse Call," "and Emergency Signaling" or "and Fire Alarm," as appropriate (e.g., "General Signaling and Fire Alarm Equipment").

Some of these products are also Listed under Energy Management, Information Technology or Telephone categories. When applicable, the product name may include "and Enclosed Energy Management," "and Temperature-

Signal System Units (UDTZ)—Continued

indicating," "and Temperature-regulating," "and Information Technology" or "and Telephone," as appropriate (e.g., "General Signaling and Telephone Equipment").

For products also bearing the Signaling Mark, the product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

F - Fire Alarm Equipment

HN - Hospital Signaling and Nurse Call Equipment

G - General Signaling Equipment

E - Emergency Signaling Equipment

EM - Enclosed Energy Management Equipment

IT - Information Technology Equipment

T - Telephone Equipment

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SPEAKERS (UEAY)

USE AND INSTALLATION

This category covers speakers investigated for use in general-utility signaling applications with respect to risk of fire and electric shock.

Where a certified product is formed by the assembly of two or more parts and all parts are not provided as a single package, the specific parts are identified in the individual certifications, and each part bears a separate Certification Mark. Marking on each part references installation instructions that show assembly and installation of the parts to form a certified product.

All products covered under this category are intended for indoor use only, unless otherwise specifically identified as suitable for outdoor use by markings on the product and in the individual certifications.

Speakers and their accessories that have been investigated for mounting in air-handling spaces are specifically identified by markings on the product and in the individual certifications. Installation details are shown on the product or are provided in a separate installation document provided with the product and referenced in the marking on the product.

PRODUCT MARKINGS

Each product is marked to indicate its intended use. This consists of the term "Signaling Speaker," "Signaling Speaker Enclosure" or "Signaling Speaker Accessory."

RELATED PRODUCTS

Devices intended for use in fire alarm and/or emergency communication systems are covered under Speakers and Amplifiers for Fire Protective Signaling Systems (UUMW). These devices are also suitable for use in general-utility signaling applications.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1480, "Speakers for Fire Alarm, Emergency, and Commercial and Professional Use."

The basic standard used to investigate nonmetallic materials of products marked suitable for use in air-handling spaces is UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "General Signaling Equipment" or "General Signaling Subassembly."

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

G - General Signaling Equipment

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VISUAL-SIGNAL APPLIANCES (UEES)

USE AND INSTALLATION

This category covers visual-signal appliances and accessories intended for use in general-signaling applications. These devices have been investigated with respect to risk of fire and shock.

Accessories, such as enclosures and back boxes, and the products with which they are compatible are identified in the individual certifications.

Where multiple parts are employed to form a complete unit, the specific parts are identified in the individual certifications. The marking on each part references installation instructions which show assembly and installation of the parts to form a certified product.

These products are intended for indoor use only unless otherwise specifically marked.

PRODUCT MARKINGS

Each product is marked to indicate its intended use. This consists of the term "Visual Signaling Appliance" or "Visual Signaling Appliance Accessory."

RELATED PRODUCTS

Devices intended for use in fire alarm and/or emergency-protective signaling applications are covered under Visual-signal Appliances for Fire Protective Signaling Systems (UVAV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1638, "Visual Signaling Appliances – Private-Mode Emergency and General Utility Signaling."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "General Signaling Equipment" or "General Signaling Subassembly."

The product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

G – General Signaling Equipment

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SIGNAL APPLIANCES, MISCELLANEOUS (UEHX)

GENERAL

This category covers miscellaneous signaling appliance units that have been investigated only for hazard of fire and electric shock and are not associated with property protection and/or life safety. The general-purpose signaling nature of each product is categorized as Type NM (Nonmonitored).

PRODUCT MARKINGS

Each product is marked to indicate its intended use. This consists of the phrase "Type NM" and a the specific use description as indicated in the individual certifications.

RELATED PRODUCTS

For information regarding Emergency Signaling, see Emergency Alarm Equipment (FSVW), Emergency Alarm System Control Units (FSZI) and Emergency Alarm System Accessories (FSYB).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2017, "General-Purpose Signaling Devices and Systems."

UL MARK

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "General Signaling Equipment" or "General Signaling Subassembly."

Some of these products are also Listed under other Signaling categories. When applicable, the Signaling Mark is also included. The Signaling Mark consists of the Listing Mark elements detailed above, with the word "SIGNALING" above the UL symbol and the word "LISTED" below the UL

Signal Appliances, Miscellaneous (UEHX)–Continued

symbol. When applicable, the product name may include "and Hospital Signaling and Nurse Call," "and Emergency Signaling" or "and Fire Alarm," as appropriate (e.g., "General Signaling and Fire Alarm Equipment").

Some of these products are also Listed under Security categories. When applicable, the Security Mark is also included. The Security Mark consists of the Listing Mark elements detailed above, with the word "SECURITY" above the UL symbol and the word "LISTED" below the UL symbol. When applicable, the product name may include "and Security" (e.g., "General Signaling and Security Equipment").

Some of these products are also Listed under Energy Management, Information Technology or Telephone categories. When applicable, the product name may include "and Enclosed Energy Management," "and Information Technology" or "and Telephone," as appropriate (e.g., "General Signaling and Telephone Equipment").

For products also bearing the Signaling Mark, the product name may be abbreviated as follows: The word "Type:" followed by the appropriate Type Code (as shown below), additionally followed by "Subassembly," as applicable.

Type Codes:

S – Security Equipment

F – Fire Alarm Equipment

HN – Hospital Signaling and Nurse Call Equipment

G – General Signaling Equipment

E – Emergency Signaling Equipment

EM – Enclosed Energy Management Equipment

IT – Information Technology Equipment

T – Telephone Equipment

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SIGNAL APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (UFXR)

Equipment for use in hazardous locations investigated for fire-protective signaling service also appears under Signal and Fire Alarm Equipment and Services (SYK) in the Fire Protection Equipment Directory.

AUDIBLE-SIGNAL APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (UGKZ)

GENERAL

This category covers audible-signal appliances, such as bells, sirens and horns.

Audible-signal appliances certified for use in any of the groups under Class I hazardous locations have been investigated with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. Those for use in any of the groups under Class II hazardous locations have been investigated for dust-tightness and have been subjected to operation tests to establish safety of operation in the presence of the specific combustible dusts, and also to establish that they will function as intended with dust accumulated on external parts.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Audible Signal Appliance for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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PRODUCT CATEGORIES BY CATEGORY CODE

EXTINGUISHING SYSTEM ATTACHMENTS FOR USE IN HAZARDOUS LOCATIONS (UGYX)

GENERAL

This category covers devices having electrical signaling contacts that are designed for attachment to extinguishing system equipment so as to provide (1) alarm signals indicating discharge of extinguishing means, and (2) supervisory signals indicating abnormal conditions of extinguishing system equipment and restoration to normal.

The signal contacts of these attachments may be of the noncoded or coded type.

Devices classed as noncoded types have contacts that perform a switching function and are intended for connection to actuating circuits of a separate electrically operated transmitter or to the signaling line circuit of a separate electrical control unit by which their action is indicated.

Devices classed as coded types have contacts that perform a coded signaling impulse function resulting from the operation of a transmitting mechanism, which is a part of the attachment, and are intended for connection to the signaling line circuit of a separate electrical control unit by which their action is indicated.

ATTACHMENT TYPES

Attachments for automatic sprinkler systems are classed as follows:

Waterflow Alarm Signal Types

Alarm Dry-pipe Valve Attachment — Mechanically operated on lifting of alarm valve clapper or pressure operated by suitable connection to alarm or dry-pipe valve piping trim.

Waterflow Indicator — Paddle operated.

Special Attachment — Type not included by above class.

Supervisory Signal Types

Valve Position Signal Attachment — Operated by mechanical linkage to movable parts of valve.

Water Level Signal Attachment — Operated by tank float.

Pressure Signal Attachment — Operated by pressure change of air, steam or water.

Temperature Signal Attachment — Operated by water or air temperature change.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Extinguishing System Attachment for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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FIRE ALARM DEVICES FOR USE IN HAZARDOUS LOCATIONS (UHMV)

USE AND INSTALLATION

This category covers coded and noncoded fire alarm boxes and fire and watch boxes for use with private fire alarm systems.

Authorities Having Jurisdiction should be consulted before installation.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fire Alarm Box for Hazardous Locations" or "Fire and Watch Box for Hazardous Locations."

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Fire Alarm Devices for Use in Hazardous Locations (UHMV)—Continued

any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FLAME-AUTOMATIC FIRE DETECTORS FOR USE IN HAZARDOUS LOCATIONS (UIAZ)

USE AND INSTALLATION

This category covers fire detectors designed to detect flames, either in infrared or ultraviolet regions.

Each detector provides signaling contacts for connection to a signal-indicating appliance, electrically actuated transmitters, or a system control unit to form a fire alarm system as indicated by the installation wiring diagram supplied with the unit.

Each unit is intended to be installed in accordance with the manufacturer's control drawing, the Authority Having Jurisdiction, and ANSI/NFPA 72, "National Fire Alarm Code," or other NFPA standards that may apply.

Detector Location

The location of flame detectors should be based on an engineering survey of the conditions to be anticipated in service and the principle of operation. Detectors should be installed only after a thorough study has been made of the area or premises to be protected (whether in planning or construction stage) and of the life and property values involved. Prior to engineering, a layout of an installation and a copy of the manufacturer's technical bulletin should be obtained and reviewed to determine recommended detector locations. Consideration should be given to all features which could have a bearing on the location and sensitivity of the detectors, including such pertinent factors as coverage in partitioned sections, ceiling heights, and overlapping of areas of cone coverage to provide maximum protection. Test flames should be employed to check proper detector location.

Environmental Considerations

Where indicated in the individual certifications, detectors are intended for indoor and/or outdoor use. For indoor use, detectors should be located in areas where normal ceiling temperatures prevail. For outdoor use, detectors should be located such that an accumulation of snow, dirt, or road film is not likely to occur on the lens. Accordingly, detectors should be located under a building overhang or positioned on a downward angle to minimize the occurrence of such conditions.

Detectors should not be installed where unwanted false alarms are likely to occur, such as other sources of ultraviolet or infrared radiation.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 268, "Smoke Detectors for Fire Alarm Signaling Systems."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flame-automatic Fire Detector for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

GROUND INDICATORS FOR USE IN HAZARDOUS LOCATIONS (UIOR)

GENERAL

This category covers electronic-type ground indicators, the ratings of which are given on the individual product. These devices indicate by audible or visible signals whether an adequate connection to gasoline tank trucks, tank cars, or drums has been established for dissipation of static electricity.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

Ground Indicators for Use in Hazardous Locations (UIOR)—Continued

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Ground Indicator for Use in Hazardous Locations."

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HEAT-ACTUATED DEVICES FOR SPECIAL APPLICATION FOR USE IN HAZARDOUS LOCATIONS (UIPV)

USE AND INSTALLATION

This category covers fixed-temperature, heat-actuated-type detectors employing special constructions designed to detect an abnormal increase in air temperature.

These detectors are intended to be installed adjacent to the equipment being protected in indoor locations in a manner acceptable to the Authority Having Jurisdiction and in accordance with ANSI/NFPA 72, "National Fire Alarm Code," or other NFPA standards that may apply, such as for extinguishing-system applications. The temperature rating of the detector should be taken into consideration with regard to installation in specific ambient environments under operating conditions of the equipment to be protected. The detectors are intended to be connected to the initiating-device circuits of certified control units that provide audible-alarm signals or employed as part of an extinguishing system.

Authorities Having Jurisdiction should be consulted before installation.

Spacings for Equipment Protection — Reference should be made to the manufacturer's installation drawings and instructions. Spacings for smooth ceilings with large bays are included in the individual certifications.

RELATED PRODUCTS

For open-area protection, see Heat-automatic Fire Detectors for Use in Hazardous Locations (UIRV).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Heat-actuated Device for Special Application for Use in Hazardous Locations."

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HEAT-AUTOMATIC FIRE DETECTORS FOR USE IN HAZARDOUS LOCATIONS (UIRV)

USE AND INSTALLATION

This category covers fire alarm heat detectors only, and not the wiring or other appliances of which they form a part.

Fire alarm heat detectors are of the fixed temperature (FT), rate of rise (ROR), combination fixed temperature and rate-of-rise (ROR-FT), or rate compensation (RC) type. There are basically two types: (1) A spot-pattern-type detector is one in which the thermally sensitive element is a compact unit of small area; (2) a line-pattern-type detector is one in which the thermally sensitive element is continuous along a line.

These heat detectors are intended for locations where normal ceiling temperatures prevail (below 100°F). Locations where temperatures at ceiling

Heat-automatic Fire Detectors for Use in Hazardous Locations (UIRV)—Continued

are likely to be unduly high (from sources of heat other than fire conditions, such as boiler rooms, dry kilns, etc.) demand special consideration and selection of heat detectors operating normally at higher temperatures, and which are capable of withstanding high temperatures for long periods of time. Care should be exercised to select heat detectors having the proper temperature rating to guard against false alarms from premature operation:

For ceiling temperatures not exceeding 100°F, install 135 to 165°F (ordinary) rating thermostats

For ceiling temperatures exceeding 100°F, but not 150°F, install intermediate 175 to 225°F rating thermostats

For ceiling temperatures exceeding 150°F, but not 225°F, install 250 to 300°F (high) rating thermostats

For ceiling temperatures exceeding 225°F, but not 300°F, install 325 to 360°F (extra high) rating thermostats

Low-degree-rated heat detectors are intended only for installation in areas having controlled temperature conditions at least 20°F below rating.

The spacings specified are for flat, smooth-ceiling construction of ordinary height, generally regarded as the most favorable condition for distribution of heated air currents resulting from a fire. Under other forms of ceiling construction reduced spacing of thermostats may be required. The fire tests conducted to determine the suitability of the spacings are conducted in a 60 x 60 ft room having a 15 ft 9 in. high smooth ceiling and minimum air movement. The test fire (denatured alcohol) is located approximately 3 ft above the floor and of a magnitude so that sprinkler operation is obtained in approximately two minutes. For comparative purposes, automatic sprinklers rated 160°F are installed on a 10 x 10 ft spacing schedule in an upright position with the deflectors approximately 7 in. below the ceiling. At the maximum permissible spacing for the heat detectors, they must operate prior to operation of the sprinklers.

The placement and spacing of thermostatic devices should be based on consideration of the ceiling construction, ceiling height, room or space areas, space subdivisions, the normal room temperature, possible exposure of the devices to abnormal heat, such as may be produced by manufacturing processes or equipment and to draft conditions likely to be encountered at the time of a fire.

For certifications that include references to "rain tight type," the devices have been subjected to tests designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

These detectors are intended to be installed in accordance with ANSI/NFPA 72, "National Fire Alarm Code." Authorities Having Jurisdiction should be consulted before installation.

RELATED PRODUCTS

Heat detectors having normally closed contacts used in special applications are covered under Heat Detectors for Releasing Device Service for Use in Hazardous Locations (TBGR).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fire Detection Heat Detector for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SIGNAL SYSTEM UNITS FOR USE IN HAZARDOUS LOCATIONS (UJFT)

GENERAL

This category covers units intended to be used in combinations with related certified equipment to form installed systems for general-utility-signaling purposes.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

PRODUCT CATEGORIES BY CATEGORY CODE

SIGNAL APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (UFXR)
Signal System Units for Use in Hazardous Locations (UJFT)—Continued

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Signal System Unit for Use in Hazardous Locations" or "Signal System Unit (Associated Apparatus)," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SIGNAL APPLIANCES, MISCELLANEOUS FOR USE IN HAZARDOUS LOCATIONS (UJPX)
USE

This category covers miscellaneous signal appliances and equipment intended for use in signaling systems.

RELATED PRODUCTS

Equipment that has been investigated for use only in the classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Magnetic-operated Contact for Use in Hazardous Locations," "Signal Relay for Use in Hazardous Locations" or "Monitor Unit (Associated Apparatus)," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SIGNALING EQUIPMENT ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (UJQO)
USE

This category covers retrofit devices in kits consisting of parts and/or sub-assemblies, installation/instruction manuals, and retaining means, intended for field installation in UL-certified audible-signaling appliances for use in hazardous locations. These products have been investigated to determine that when used in accordance with the manufacturer's instructions they do not adversely affect the operation of the complete unit.

PRODUCT MARKINGS

Retrofit devices are marked with electrical and environmental ratings as specified in the individual Reports.

ADDITIONAL INFORMATION

For additional information, see Signal Appliances for Use in Hazardous Locations (UFXR) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 464, "Audible Signal Appliances," or ANSI/UL 1480, "Speakers for Fire Alarm, Emergency, and Commercial and Professional Use."

SIGNAL APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (UFXR)
Signaling Equipment Accessories for Use in Hazardous Locations (UJQO)—Continued

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

AUDIBLE SIGNAL RETROFIT KIT FOR USE WITH LISTED [model number(s)] ONLY
Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SMOKE-AUTOMATIC FIRE DETECTORS FOR USE IN HAZARDOUS LOCATIONS (UJRN)
GENERAL

This category covers detecting combinations designed to detect smoke particles. Smoke detectors may or may not be designed to be connected to fire alarm system control units. See APPLICATIONS below.

A heat detector and/or an audible signaling appliance may be provided integral with the detector.

The primary function of duct detectors is to shut down the blowers and/or dampers of air conditioning and ventilating systems in an attempt to prevent a possible panic and smoke damage from distribution of smoke. Duct detectors are not intended as a substitute for open-area protection.

The level of toxicity produced by the combustibles at which smoke detectors actuate has not been investigated.

DETECTOR TYPES

Air Sampling (AS) — Consists of air-sampling ports at the ends of piping or tubing extending from the detector unit to the areas to be protected. A pump draws air from the protected area through the ports and tubing to the detector where the air is analyzed for fire products.

Photoelectric (P) — Designed to detect an abnormal density of smoke particles, either by obscuration of a projected light path or reflection of light from the smoke particles onto a light-sensitive element.

Ionization (I) — An ionization smoke detector has a small amount of radioactive material that ionizes the air in the sensing chamber, thus rendering it conductive and permitting a current flow through the air between two charged electrodes. This gives the sensing chamber an effective electrical conductance. When smoke particles enter the ionization area, they decrease the conductance of the air by attaching themselves to the ions, causing a reduction in mobility. When the conductance is less than a predetermined level, the detector circuit responds.

Combination Photoelectric/Ionization (P/I) — Employs both principles of detection in one unit.

Projected Beam (PB) — A light beam is projected across the space of the area to be protected.

Integral Radio Frequency Transmitter (RF) — Uses an integral radio frequency transmitter to communicate with a receiver in the fire alarm control panel, in place of a wired connection.

APPLICATIONS

Duct Detector [D(I)] — For installation inside the duct.

Duct Detector [D(ST)] — Intended for installation on the side of the duct. Employs sampling tubes that extend into the duct.

Open-area Protection (OAP) — Requires detector connection to a compatible system control unit for operation.

Releasing Service (RS) — Intended for detector connection only to releasing devices, such as electromagnetic door holders, fire dampers, etc.

Open-area Protection with Releasing Service (OAP/RS) — Incorporates supplementary switching contacts for additional connection to releasing devices.

Special Application (SA) — For installation in nonstandard locations, as noted in the individual Listings.

COMPATIBILITY WITH CONTROL UNITS

Smoke detectors investigated for open-area protection are intended to be connected to the initiating device circuit of a fire alarm system control unit.

Multiple-wire detectors, employing power-supply terminals or leads that do not obtain power from the initiating device circuit of a system control unit, are compatible with any Listed system control unit if failure of the power to the detector is supervised at the control unit.

Two-wire detectors, whose power-supply terminals or leads are the same as the signaling terminals, and obtain power from the initiating device cir-

Smoke-automatic Fire Detectors for Use in Hazardous Locations (UJRN)—Continued

cuit of a system control unit, are investigated for compatibility either by test or a review of the circuit parameters of both the detector and control unit. Listing is restricted only to those control units with which such an investigation was made. Interconnection limitations and compatible models are indicated on the installation wiring diagram of the control unit and/or the detectors.

INSTALLATION

Standards — Refer to ANSI/NFPA 72, “National Fire Alarm Code,” and ANSI/NFPA 90A, “Standard for the Installation of Air-Conditioning and Ventilating Systems,” for installation, maintenance and testing guidelines.

Spacings — Although there are no assigned spacings to these detectors, test fires, using the maximum amount of combustible for the risk involved, may be employed. See ANSI/NFPA 72 for additional guidelines.

Environmental Considerations — Open-area detectors are intended for indoor use only where normal ceiling temperatures [max 37.8°C (100°F)] prevail. Care should be used that detectors are not installed in areas where conditions may cause unwanted (false) alarms.

Duct detectors are intended to be installed in ducts of heating, ventilating, and air conditioning systems where temperatures at the detector do not exceed 37.8°C (100°F).

Ionization detectors should not be used in an environment of high-level radiation unless tests in the actual environment have shown that the radiation will not interfere with operation of the detectors.

Effect of Velocity — The velocities indicated in the individual Listings are the maximum and minimum to which the detector has been subjected in performance tests without indication of a false alarm or abnormal shift in sensitivity. The performance of photoelectric-type detectors is not affected by velocity. Velocity limits for duct detectors are based on response to fire tests in ANSI/UL 268A, “Smoke Detectors for Duct Application.”

Stability Test — Since there are innumerable environmental conditions that exist in the field, it is recommended that the stability of detectors be monitored prior to connection to a fire alarm system for at least three months or more to screen out locations of detectors where unwanted alarms may occur. Relocation of the detectors, use of a detector with a different principle of operation, or a change in the sensitivity setting where permitted in the marking of the detector, may be required.

Authorities Having Jurisdiction should be consulted before installation.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate open area and releasing service detectors in this category is ANSI/UL 268, “Smoke Detectors for Fire Alarm Signaling Systems.”

The basic unclassified locations standard used to investigate duct detectors in this category is ANSI/UL 268A, “Smoke Detectors for Duct Application.”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate:

Nonseparable Heads and Bases

- Smoke-automatic Fire Detector for Use in Hazardous Locations (+) for Open-area Protection
- Smoke-automatic Fire Detector for Use in Hazardous Locations (+) for Open-area Protection (Also Suitable for Releasing Device Service)
- Smoke-automatic Fire Detector for Use in Hazardous Locations (+) for Releasing Device Service
- Smoke-automatic Fire Detector for Use in Hazardous Locations (+) for Duct Application

Separable Heads

- Smoke-automatic Fire Detector (+) Head for Use in Hazardous Locations for Use with a (*) UL Listed Base
- Smoke-automatic Fire Detector Head (+) for Use in Hazardous Locations for Open-area Protection When Used with a (*) UL Listed Base
- Smoke-automatic Fire Detector Head for Use in Hazardous Locations (+) for Open-area Protection When Used with a (*) UL Listed Base (Also Suitable for Duct Application)
- Smoke-automatic Fire Detector Head for Use in Hazardous Locations (+) for Open-area Protection When Used with a (*) UL Listed Base (Also Suitable for Releasing Device Service)
- Smoke-automatic Fire Detector Head for Use in Hazardous Locations

Smoke-automatic Fire Detectors for Use in Hazardous Locations (UJRN)—Continued

- (+) for Releasing Device Service When Used with a (*) UL Listed Base Smoke-automatic Fire Detector Head for Use in Hazardous Locations
- (+) for Duct Application When Used with a (*) UL Listed Base Smoke-automatic Fire Detector Head for Use in Hazardous Locations When Used with a (*) UL Listed Smoke-duct Detector Housing

Separable Bases and Duct Housing

- Automatic Fire Detector Base (+) for Use with a (*) UL Listed Head for Use in Hazardous Locations
- Automatic Fire Detector Base (+) for Open-area Protection When Used with a (*) UL Listed Head for Use in Hazardous Locations
- Automatic Fire Detector Base (+) for Open-area Protection When Used with a (*) UL Listed Head for Use in Hazardous Locations (Also Suitable for Duct Application)
- Automatic Fire Detector Base (+) for Open-area Protection When Used with a (*) UL Listed Head for Use in Hazardous Locations (Also Suitable for Releasing Device Service)
- Automatic Fire Detector Base (+) for Open-area Protection When Used with a (*) UL Listed Head for Use in Hazardous Locations (Also Suitable for Releasing Device Service and Duct Application)
- Automatic Fire Detector Base (+) for Releasing Device Service When Used with a (*) UL Listed Head for Use in Hazardous Locations
- Smoke-duct Detector Housing for Use with (*) UL Listed Head for Use in Hazardous Locations

Separable System Assemblies

- Smoke-automatic Fire Detector Projected Beam System Unit for Use in Hazardous Locations
- Smoke-automatic Fire Detector Air-sampling System Unit for Use in Hazardous Locations
- Smoke-automatic Fire Detector for Duct Application Subassembly for Use in Hazardous Locations

* Company name or File no. (EXXXXX)

+ To be inserted when applicable: “with Integral Audible Signal,” “with Integral Heat Detector” or “with Integral Audible Signal and Heat Detector”

Detectors with the designation “with Integral Audible Signal” in the product name include an audible signaling appliance in the unit (head or base), which is energized under an alarm condition.

Detectors with the designation “with Integral Heat Detector” in the product name include a heat detector in the unit, which is connected internally to the smoke detector alarm circuit. Actuation of the heat detector results in the same alarm signal as obtained from the smoke detector.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

VISUAL-SIGNAL APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (UJTK)

GENERAL

This category covers visual-signal appliances, such as rotating beacons and strobe lights, intended for use in general-signal applications, and sub-assemblies of visual-signal appliances intended for final assembly into visual-signal appliances.

Subassemblies, such as mounting bodies, globes and guards, and the products with which they are compatible are identified in the individual certifications.

Where multiple parts are employed to form a complete unit, the specific parts are identified in the individual certifications. Marking on each part references installation instructions which show assembly and installation of the parts to form a certified product.

Visual-signal appliances certified for use in any of the groups under Class I hazardous locations have been tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. Those for use in any of the groups under Class II hazardous locations have been tested for dust-tightness and have been subjected to operation tests to establish safety of operation in the presence of the specific combustible dusts and also to establish that they will function as intended with dust accumulated on external parts.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 1638, “Visual Signaling Appliances - Private-Mode Emergency and General Utility Signaling.”

PRODUCT CATEGORIES BY CATEGORY CODE

SIGNAL APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (UFXR)

Visual-signal Appliances for Use in Hazardous Locations (UJTK)–Continued

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Visual-signal Appliance for Use in Hazardous Locations" or "Visual-signal Appliance Subassembly for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SIGNAL APPLIANCES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (UXUQ)

AUDIBLE-SIGNAL APPLIANCES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (UXVF)

GENERAL

This category covers audible-signal devices, such as bells, sirens and horns.

Audible-signal devices certified for use in any of the zones under Class I hazardous locations have been tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Audible Signal Appliance for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

VISUAL-SIGNAL APPLIANCES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (UXVU)

GENERAL

This category covers visual-signal devices, such as rotating beacons and strobe lights.

Visual-signal devices certified for use in any of the zones under Class I hazardous locations have been tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

SIGNAL APPLIANCES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (UXUQ)

Visual-signal Appliances for Use in Zone Classified Hazardous Locations (UXVU)–Continued

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Visual Signal Appliance for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SIGNALING APPLIANCES AND EQUIPMENT FOR THE HEARING IMPAIRED FOR USE IN HAZARDOUS LOCATIONS (UXWC)

GENERAL

This category covers visual-signaling appliances, vibrators or other sensory apparatus and associated equipment investigated for fire-protective-signaling services to alert hearing-impaired persons, and subassemblies of signaling appliances intended for final assembly into signaling appliances.

Subassemblies, such as mounting bodies, globes and guards, and the products with which they are compatible are identified in the individual certifications.

Where multiple parts are employed to form a complete unit, the specific parts are identified in the individual certifications. Marking on each part references installation instructions that show assembly and installation of the parts to form a certified product.

These signaling appliances are intended to be used in conjunction with certified compatible fire-alarm-control units, alarm-initiating devices and the like. The interconnection, use and installation requirements of the products are intended to be in accordance with ANSI/NFPA 72, "National Fire Alarm Code."

The signaling appliances in this category have been investigated as to their ability to alert most hearing-impaired persons. However, since the ability of signal recognition varies among individuals, the effectiveness of alerting a person can only be ensured by actual testing of that person with the installed signaling appliance.

Visual-signaling appliances covered under this category are intended to be used in the "Public Operating Mode" as defined in ANSI/NFPA 72.

RELATED PRODUCTS

Visual-signaling appliances intended to be used in the "Private Mode" are covered under Visual-signal Devices for Use in Hazardous Locations (UJTK).

This category does not cover signaling devices for the hearing impaired that are an integral part of other alarm-initiating or alarm-indicating devices. When such a combination exists, suitability as a signaling appliance for the hearing impaired will be noted in the individual certifications of the primary product. Refer to Audible-signal Devices for Use in Hazardous Locations (UGKZ).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 1971, "Signaling Devices for the Hearing Impaired."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Signaling Appliance for the Hearing Impaired for Use in Hazardous Locations," "Signaling Appliance Accessory for the Hearing Impaired for Use in Hazardous Locations" or "Signaling Appliance Subassembly for the Hearing Impaired for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or

**SIGNALING APPLIANCES AND EQUIPMENT FOR THE
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(UXWC)**

any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SIGNS (UXYT)

USE AND INSTALLATION

This category covers electric signs employing incandescent lamps, LEDs (light-emitting diodes), electro-luminescent panels, neon tubing, fluorescent lamps, high-intensity-discharge lamps or combinations thereof for installation in accordance with Article 600 of ANSI/NFPA 70, "National Electrical Code."

Cord-and-plug-connected signs do not have provision for permanent mounting to a building or structure. Due to servicing considerations, specific types of cord and plug-connected signs are intended and have provision for installation on end-use equipment.

Signs or sections of a sign forming a complete enclosure intended for permanent connection to a source of supply are provided with permanent means for attachment to a building, to a support or to a hanging rig. The mounting hardware, poles and other structural components of a sign have not been evaluated with respect to local variable conditions such as local wind and snow loading or soil conditions.

Electric signs, of such size that shipment in one carton or fully assembled is impractical, may be divided into sections. Each major subassembly bears an "Electric Sign Section" Certification Mark. Sign faces, trim and mounting hardware are not considered major subassemblies. Each sign has installation instructions describing or illustrating the proper assembly, mounting and connection of the sign sections. The acceptability of the assembled sections in the field rests with the Authority Having Jurisdiction.

PRODUCT MARKINGS

Signs intended for permanent installation and which have been investigated for indoor use only are so marked. Cord-connected signs investigated for outdoor use are marked "Outdoor." Signs for outline lighting are marked "Outdoor Sign for Outline Lighting."

Signs, sign sections or outline lighting marked "The neon supply(ies) complies(y) with the secondary ground-fault protection requirements of UL 2161" are provided with neon transformers and power supplies that comply with the secondary fault protection requirements specified in UL 2161, "Neon Transformers and Power Supplies."

REBUILT PRODUCTS

This category also covers signs that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt signs are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt signs are subject to the same requirements as new signs.

RELATED PRODUCTS

Accessories intended for use in certified signs are covered under Sign Accessories (UYMR).

Retrofit conversions intended to be field installed in certified electric signs are covered under Sign Conversions, Retrofit (UYWU).

Changing message center signs may contain integral controllers or may be intended for use with externally connected controllers. Externally connected controllers are covered under Sign Controllers, Message Centers (UYTQ).

This category does not cover billboard illumination, exit lights, skeletal neon tubing for show windows, or illuminated clocks rated 600 V or less.

Field-assembled neon systems used in display windows, outline lighting, or skeletal neon signs are covered under Skeletal Neon Sign and Outline Lighting Systems, Field Assembled (UZBL).

Field-assembled cold cathode electric discharge lighting systems that provide general illumination are covered under Electric Discharge Lighting Systems, Cold Cathode (IFAY).

Field-installed neon outline lighting systems that outline or call attention to architectural details of a room or building are covered under Field-installed Neon Outline Lighting Systems (UYAM).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 48, "Electric Signs."

Electric signs that comply with the requirements in UL 153, "Portable Electric Lamps," may also be certified as Portable Lamps (QOWZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Indoor Electric Sign," "Electric Sign" or "Electric Sign Section."

For rebuilt signs the word "Rebuilt" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FIELD-INSTALLED NEON OUTLINE LIGHTING SYSTEMS (UYAM)

This category covers neon outline lighting systems that incorporate neon tubing with ferrule type end caps which are electrically connected to the output of a transformer, power supply or ballast by ferrule type lampholders. Each transformer or power supply in the system has a maximum output current rating of 300 mA. These systems are for installation in accordance with Article 600 of the National Electrical Code.

These lighting systems outline or call attention to architectural details of a room or building.

Neon outline lighting systems are provided as a system of parts that are field installed. These systems are installed using tools and techniques available only to an electrician. The systems are provided with installation instructions which define the scope of the system and method for installation. It is intended that the system installation instructions be retained with the installation to which they apply.

The Listing of a neon outline lighting system does not constitute approval of the design which is the responsibility of the manufacturer and the Authority Having Jurisdiction nor approval of the installation. The final acceptance of the field installed neon outline lighting system is the responsibility of the Authority Having Jurisdiction.

These systems are intended for permanent installation indoors unless marked as "Suitable for Outdoor Locations".

Neon outline lighting systems marked "The neon supply(ies) complies(y) with the secondary ground-fault protection requirements of UL 2161" are provided with neon transformers and power supplies that comply with the secondary ground-fault protection requirements specified in the Standard for "Neon Transformers and Power Supplies", UL 2161.

This category does not cover neon tubing for display windows or signs which are covered under category Signs (UXYT).

This category does not cover field assembled neon systems in display windows, outline lighting, or skeletal neon signs which are covered under the category of "Field Assembled Skeletal Neon Signs and Outline Lighting Systems", (UZBL)

This category does not cover cold cathode electric discharge lighting systems for general illumination which are covered under the category "Electric Discharge Lighting Systems, Cold Cathode", (IFAY).

Outline lighting of the incandescent, HID or fluorescent type fabricated in factory-built sections is covered under the category Signs (UXYT).

Lighting systems operating at 1000V or less are covered under categories Fluorescent Fixtures (IEUZ), HID Fixtures (IEXT), and Incandescent Fixtures (IEZR).

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

The basic standard used to investigate products in this category is ANSI/UL 48, "Electric Signs."

The Listing Mark of UL on each transformer and transformer enclosure, and the containers in which the remaining neon outline lighting system parts are packaged, or on the remaining neon outline lighting system parts themselves, referencing a specific field-installed neon outline system number is the only method provided by UL to identify neon outline lighting systems manufactured under its Listing and Follow-Up Services. The Listing mark for these systems includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, the product name, "Field Installed Neon Outline Lighting System Part", and the words "The Listing of this neon outline lighting system is contingent upon installation according to the specifications of (Listee's Name), System No. _____ and the National Electrical Code".

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SIGNS, CHANGING MESSAGE (UYFS)

GENERAL

This category covers illuminated and nonilluminated changing-message signs intended to be installed and connected to an electrical supply source in accordance with ANSI/NFPA 70, "National Electrical Code."

Illuminated changing-message signs include incandescent, fluorescent, HID (high intensity discharge), electric discharge tubing (including neon) LED (light emitting diode), and other sources of illumination.

Signs, Changing Message (UYFS)–Continued

Nonilluminated changing-message signs include scrolling, flipper, LCD (liquid crystal display), and similar types that are generally motor operated or electronically controlled.

Sign Section — The changing-message signs may be divided into sections. Each section of the sign bears a “Changing Message Sign Section” Certification Mark that states in combination with the Certification Mark “Section ___ of ___.” The first blank space identifies the number of the section, and the second blank space identifies the total number of sections required to constitute a complete changing-message sign. Suitable installation instructions describing or illustrating the proper assembly, mounting, and connection of the numbered sign sections are provided.

SIGN INSTALLATION MARKINGS

Indoor/Outdoor Use — Permanently connected changing-message signs are investigated and intended for use outdoors unless marked “For Indoor Use Only.” Cord-connected changing-message signs are investigated and intended for use indoors unless marked “Portable Outdoor Changing Message Sign.”

Trailer Mounted — Changing-message signs intended to be trailer mounted are marked “Trailer On Which Sign May Be Mounted Has Not Been Investigated.”

Orientation Marking — A changing-message sign intended for outdoor use that is not provided with construction features to ensure proper orientation is marked to indicate the proper mounting position.

Wall Mounted — A changing-message sign for outdoor use, wall mounting and provided with drain holes along the bottom edge of the back of the sign, and marked “Maintain 1/2 Inch Clearance Between All Drain Openings And The Mounting Surface” is intended to be installed so that the drain holes are not covered by the building surface.

REBUILT PRODUCTS

This category also covers rebuilt changing-message signs which have been reconditioned or rebuilt. Such changing-message signs have been factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Reconditioned or rebuilt changing-message signs are subject to the same requirements as new changing-message signs.

RELATED PRODUCTS

Components and parts intended for use on or with changing-message signs are covered under Sign Accessories (UYMR), Sign Conversions Retrofit (UYWU), and Sign Controllers, Message Centers (UYTQ).

Changing-message signs may also be covered under Signs (UXYT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSU/UL 48, “Electric Signs,” and UL 1433, “Control Centers for Changing Message Type Electric Signs.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Indoor Changing Message Sign,” “Changing Message Sign” or “Changing Message Sign Section.”

For rebuilt products, the word “Rebuilt” precedes the product name.

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SIGN ACCESSORIES (UYMR)

USE

This category covers sign components, such as combinations of frame plastic panels with metal or plastic characters; sign-rotating equipment for use in electric signs where weather protection and electrical enclosures are provided by the sign; ballast lead covers or enclosures intended to provide weather and mechanical protection to leads of outdoor ballasts; fluorescent U-tube and lampholder assemblies consisting of lampholders in sheet-metal brackets with spring and loaded rod and hook assemblies with or without a ballast; insulating caps for use on electrode receptacles to provide electrical insulation; low-voltage power supplies consisting of assemblies of Class 2 transformers, an enclosure and a power-supply cord; and kickback bases intended for indoor use and provided with a receptacle for connection of a related display and provided with a power-supply cord.

RELATED PRODUCTS

Lampholders and electrode receptacles are covered under Lampholders, Electric Discharge, Over 1000 Volts (OJOV).

ADDITIONAL INFORMATION

Sign Accessories (UYMR)–Continued

For additional information, see Signs (UXYT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 879, “Electric Sign Components.” This standard supersedes ANSI/UL 48, “Electric Signs,” and ANSI/UL 73, “Motor-Operated Appliances,” which formerly contained the requirements for sign components.

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Sign Accessory.”

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SIGN COMPONENTS CLASSIFIED FOR USE WITH SPECIFIED EQUIPMENT (UYTA)

USE AND INSTALLATION

This category covers specific components Classified for use with components manufactured by others, such as:

Listed GTO cable surface marked “Integral Sleeve” that is also Classified for use with specific Listed or Recognized Component neon electrode boots; and Listed or Recognized Component neon electrode boots that are also Classified for use with specific Listed GTO cable surface marked “Integral Sleeve.”

The combination of the GTO cable with integral sleeve and neon electrode boot complies with the enclosure requirements for:

- a) the splice between neon tubing electrode leads and GTO cable, and
- b) the GTO cable leading to the splice.

These products are provided with installation instructions that define the scope of the system and method of installation.

ADDITIONAL INFORMATION

For additional information, see Signs (UXYT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 879B, “Outline of Investigation for Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice.”

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the following additional information:

[PRODUCT IDENTITY*]

CAT. NO. ___ FOR USE ONLY WITH THE SPECIFIED *
IN ** LOCATIONS

SEE INSTALLATION INSTRUCTIONS

* GTO CABLE WITH INTEGRAL SLEEVE or NEON ELECTRODE BOOT

** DRY AND DAMP or DRY, DAMP AND WET
or

[PRODUCT IDENTITY*]

CAT. NO. ___ FOR USE ONLY WITH +
IN ** LOCATIONS

* GTO CABLE WITH INTEGRAL SLEEVE or NEON ELECTRODE BOOT

+ Manufacturer’s name and catalog number (or equivalent) of the GTO Cable with Integral Sleeve or Neon Electrode Boot

** DRY AND DAMP or DRY, DAMP AND WET

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SIGN CONTROLLERS, MESSAGE CENTERS (UYTQ)

GENERAL

This category covers control panels or units intended for changing-message signs.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1433, "Control Centers for Changing Message Type Electric Signs."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Sign Controller," or other appropriate product name.

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SIGN CONVERSIONS, RETROFIT (UYWU)

USE AND INSTALLATION

This category covers retrofit sign conversions consisting of subassemblies or kits intended for field installation in certified signs. There are several types of sign conversions as specified below.

Scrolling units (motor-operated message assemblies), devices to change the type of illumination (such as from incandescent to fluorescent), or combinations thereof consist of subassemblies intended for field installation in specific certified permanently connected electric signs. The conversion identifies the catalog number (or other description) and company name of the sign in which it is intended to be used.

Light-emitting-diode (LED) kits consist of the power source, the LEDs and the LED mounting means necessary to change the type of illumination originally contained in the sign to LED illumination. The kit installation instructions specify the type of sign in which the kit is intended to be installed.

These retrofit sign conversions have been investigated to determine that, when used in accordance with the manufacturer's instructions provided with the retrofit device, they do not adversely affect the operation of the complete electric sign.

ADDITIONAL INFORMATION

For additional information, see Signs (UXYT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate retrofit sign conversions in this category is ANSI/UL 48, "Electric Signs."

The basic requirements used to investigate retrofit sign conversion LED kits in this category are contained in UL Subject 879A, "Outline of Investigation for LED Kits."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

RETROFIT SIGN CONVERSION
FOR USE ONLY WITH SIGN
MODEL ____ MANUFACTURED BY ____
Control No.

or

RETROFIT SIGN CONVERSION LED KIT
FOR USE ONLY IN ACCORDANCE WITH KIT INSTRUCTIONS
Control No.

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SIGN FLASHERS (UYZZ)

USE AND INSTALLATION

This category covers flashing devices intended to control incandescent lamps or gas-tube-sign transformers.

Sign Flashers (UYZZ)—Continued

The installation of open-type flashing devices in electric signs is intended to be in accordance with ANSI/NFPA 70, "National Electrical Code," as follows: (a) within a standard cutout box or cabinet, or (b) within an enclosed compartment, accessible and weatherproof, of metal at least as thick as that of the sign itself and located in or on the body or structure of the sign.

Flashing devices of the thermostatic type are intended to control incandescent lamps and are for indoor use only.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 48, "Electric Signs," UL 1433, "Control Centers for Changing Message Type Electric Signs," and ANSI/UL 508, "Industrial Control Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Sign Flasher," "Blinker," "Winker," "Flasher," or other appropriate product name.

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SKELETAL NEON SIGN AND OUTLINE LIGHTING SYSTEMS, FIELD ASSEMBLED (UZBL)

GENERAL

The presence of the Listing Mark ("Field Assembled Skeletal Neon Sign System" or "Field Assembled Skeletal Neon Outline Lighting System") is evidence that the installation of the skeletal neon sign or outline lighting system (1) has been assembled and installed by an installer who is authorized by UL to apply UL Listing Marks described below and who subscribes to UL's Follow-Up Service; (2) employs materials and components subject to a factory inspection service bearing the UL Mark; and (3) is subject to a field inspection program covering proper installation of the system.

These systems are field assembled for permanent installation in accordance with Article 600 of ANSI/NFPA 70, "National Electrical Code."

These systems are intended for outdoor use unless marked for indoor use.

Skeletal neon signs and outline lighting systems marked "The neon supply(ies) complies(y) with the secondary ground-fault protection requirements of UL 2161" are provided with neon transformers and power supplies that comply with the secondary ground-fault protection requirements specified in UL 2161, "Neon Transformers and Power Supplies."

The Listing of a system does not constitute approval of the completed assembly and installation which is the responsibility of the installer and the Authority Having Jurisdiction.

RELATED PRODUCTS

Field-assembled cold cathode electric-discharge lighting systems that provide general illumination are covered under Electric-discharge Lighting Systems, Cold Cathode (IFAY).

Field-installed neon outline lighting systems that outline or call attention to architectural details of a room or building are covered under Field-installed Neon Outline Lighting Systems (UYAM).

Factory-assembled neon signs and outline lighting or sectional signs that require some field assembly are covered under Signs (UXYT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate the systems in this category is ANSI/UL 48, "Electric Signs."

UL MARK

The Listing Mark on the transformer or power-supply enclosure is the only method provided by UL to identify that a field-assembled skeletal neon sign or outline lighting system is covered under its Listing and Follow-Up Service. The Listing Mark for these systems includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, the product identity "Field

Skeletal Neon Sign and Outline Lighting Systems, Field Assembled (UZBL)—*Continued*

Assembled Skeletal Neon Sign System” or “Field Assembled Skeletal Neon Outline Lighting System,” the installing company name or logo, date of installation, and location.

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SOLENOIDS FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (VAMH)

USE

This category covers solenoids for installation on valves. The solenoids are incomplete devices inasmuch as the plungers or pistons are intended to actuate an external valve or other equipment. This category covers the solenoid only and not the valve or other equipment to which the solenoids are mounted.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 429, “Electrically Operated Valves.”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Solenoid for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

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SOLENOIDS FOR USE IN HAZARDOUS LOCATIONS (VAPT)

USE

This category covers solenoids intended for connection to threaded rigid conduit. These solenoids may include the plungers or pistons intended to actuate an external valve or other equipment. This category covers the solenoid only and not the valve or other equipment to which the solenoids are mounted.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 429, “Electrically Operated Valves.”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Solenoid for Use in Hazardous Locations.”

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SOLENOID PUMPS FOR USE IN HAZARDOUS LOCATIONS (VAWS)

GENERAL

This category covers solenoid pumps for connection to threaded rigid conduit. The solenoid pumps are complete devices intended to actuate an external metering device or other equipment. These category covers the solenoid pump only and not the metering device or other equipment to which the solenoid pumps are mounted.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Solenoid Pump for Use in Hazardous Locations.”

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SOLVENT DISTILLATION UNITS FOR USE IN HAZARDOUS LOCATIONS (VBFY)

GENERAL

This category covers solvent distillation units with a maximum capacity of 60 gal (227 l), which are intended to recycle nonflammable, flammable or combustible solvents. These units have only been investigated for use with the solvent(s) indicated in the instruction manual provided with the unit. In addition, these units are marked to indicate the solvent(s) or with a statement referencing the instruction manual.

This equipment is intended for installation and use in accordance with ANSI/NFPA 70, “National Electrical Code,” ANSI/NFPA 30, “Flammable and Combustible Liquids Code,” and the “Uniform Fire Code,” published by the International Fire Code Institute.

This category does not cover carbon-bed units, units intended to be installed outdoors, units intended to distill solvents containing nitrocellulose or other unstable reactives, or units intended for high-volume distillation processes typical of the petrochemical or distilled spirits industries.

The storage, use and disposal of any flammable or combustible solvents and hazardous materials used with or produced by the equipment, the physiological effects of these solvents and hazardous wastes, and the purity of the recycled solvent have not been investigated.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 2208, “Solvent Distillation Units.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Solvent Distillation Unit for Use in Hazardous Locations,” or equivalent.

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SOUND-METERING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (VBYC)

GENERAL

This category covers equipment that measures and stores the ambient noise levels in industrial areas.

RELATED PRODUCTS

Equipment that has been investigated for use only in the classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Noise Dosimeter" or "Sound Level Meter," or other appropriate product name as shown in the individual Listings.

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SOUND-METERING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (VBYX)

USE AND INSTALLATION

This category covers sound-metering equipment that measures and stores the ambient noise levels in industrial areas.

Certain products in this category are associated apparatus and are intended for installation in unclassified locations. They are provided with intrinsically safe circuits as indicated on the product, for extension into a hazardous (classified) location.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are identified in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Noise Dosimeter for Use in Hazardous Locations," "Sound Level Meter for Use in Hazardous Locations" or "Sound Level Meter (Associated Apparatus)," or other appropriate product name as shown in the individual Listings.

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SOUND-RECORDING AND -REPRODUCING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (VCSV)

USE

This category covers speakers and similar equipment intended for use in sound-recording and -reproducing systems.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Sound-recording Equipment for Use in Hazardous Locations" or "Sound-reproducing Equipment for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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SPRINKLER SYSTEM AND WATER SPRAY SYSTEM DEVICES FOR USE IN HAZARDOUS LOCATIONS (VQNT)

These listings cover devices and equipment for use in sprinkler systems and water spray systems.

These devices and equipment should be installed in compliance with the Standards of National Fire Protection Association, NFPA 13 for Sprinkler Systems, NFPA 15 for Water Spray Systems for Fire Protection, and NFPA 16 for Foam-Water Sprinkler and Spray Systems. Inspection authorities having jurisdiction should be consulted regarding use of these listed devices and equipment before installation.

These systems also appear under "Sprinkler Systems and Water Spray System Devices" in UL's Fire Protection Equipment List.

SPECIAL SYSTEM WATER CONTROL VALVES AND SYSTEM ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (VQRZ)

Class I - See description of devices in this grouping on Guide Card VQWV.

Special System Water Control Valves for Use in Hazardous Locations (VQWV)

USE AND INSTALLATION

This category covers valves intended for controlling water flow to sprinkler and water-spray systems. Unless otherwise stated, deluge valves are intended to be installed in the vertical position only.

These valves are intended to be installed in accordance with ANSI/NFPA 13, "Installation of Sprinkler Systems," ANSI/NFPA 15, "Water Spray Fixed Systems for Fire Protection," or ANSI/NFPA 16, "Installation of Foam-Water Sprinkler and Foam-Water Spray Systems." Authorities Having Jurisdiction should be consulted regarding use of these Listed devices and equipment before installation.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Deluge Valve for Use in Hazardous Locations."

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Special System Water Control Valves for Use in Hazardous Locations (VQWV)—*Continued*

turer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SWITCHES, PRESSURE FOR USE IN HAZARDOUS LOCATIONS (VRBR)

USE

This category covers pressure-operated switches intended for connection with sprinkler equipment, water-spray systems and like protection systems, as a means of initiating electrical alarms upon flow of water in the equipment or for actuation of other auxiliary equipment.

ADDITIONAL INFORMATION

For additional information, see Sprinkler System and Water Spray System Devices for Use in Hazardous Locations (VQNT) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Pressure Switch for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

STATIC NEUTRALIZING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (VXDY)

USE AND INSTALLATION

This category covers high-voltage power units and discharge bars designed for individual installation on equipment in hazardous locations where static charges are generated during operation.

Due to the nature of these installations, high-voltage parts are necessarily exposed and cannot be completely shielded from contact.

Care should be taken to follow the instructions provided with the equipment regarding the installation of static neutralizers, including proper grounding of the equipment; operating personnel should be carefully instructed regarding its correct operation and maintenance.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Static Neutralizing Equipment for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SPILL CONTAINMENT FOR STATIONARY LEAD-ACID BATTERY SYSTEMS (VXMB)

GENERAL

This category covers spill containment for stationary lead-acid battery systems investigated for liquid tightness and electrolyte pH neutralization capability in accordance with Chapter 52 of ANSI/NFPA 1, "Uniform Fire Code," and acid resistance in accordance with OSHA 1926.441(a)(4), "Battery Locations and Battery Charging."

These systems are intended to provide a reliable means of containment for hazardous material liquids in the event of electrolyte leakage from stationary lead-acid battery systems.

Requirements for spill detection, spill clean-up, containment dimensions, containment capacity, neutralizer capacity and ventilation are included in the applicable federal or local governing codes, such as Chapter 52 of ANSI/NFPA 1, and OSHA 1926.441.

INSTALLATION

These systems are field assembled and require complete written installation instructions to ensure proper assembly.

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2436, "Outline of Investigation for Spill Containment for Stationary Lead-Acid Battery Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Spill Containment for Stationary Lead-Acid Battery Systems," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

STRAPS, RESTRAINT, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (VZAR)

USE

This category covers restraint straps made from electrically conductive natural or synthetic rubber, intended for use in hospital operating rooms where accumulation of charges of static electricity presents a hazard due to the possibility of static sparks being formed in the presence of flammable anesthetic-air mixtures.

Tests indicate that these restraint straps in lengths used in hospital operating rooms are sufficiently electrically conductive to equalize electrostatic charges between electrical conductors connected thereby.

As oil is injurious to rubber compounds and impairs the electrical conductive properties of these materials, contact with oil should be avoided.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1067, "Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrically Conductive Restraint Straps Relating to Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SURGE-PROTECTIVE DEVICES (VZCA)

GENERAL

This category covers surge-protective devices (SPDs) designed for repeated limiting of transient-voltage surges as specified in the standard on 50 or 60 Hz power circuits not exceeding 1000 V ac, or 1500 V dc, including photovoltaic applications (PV SPDs). SPDs are identified with one of the following type designations:

Type 1 — Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service equipment overcurrent device, as well as the load side, including watt-hour meter socket enclosures and intended to be installed without an external overcurrent-protective device.

Type 2 — Permanently connected SPDs intended for installation on the load side of the service equipment overcurrent device, including SPDs located at the branch panel.

Type 3 — Point-of-utilization SPDs, installed at a minimum conductor length of 10 m (30 ft) from the electrical service panel to the point of utilization, e.g., cord-connected, direct-plug-in, receptacle-type and SPDs installed at the utilization equipment being protected. The distance (10 m) is exclusive of conductors provided with or used to attach SPDs.

SPDs have been investigated to verify that the average of the transient-voltage surges is limited to the Voltage Protection Rating (VPR) marked on the product.

Voltage Protection Rating (VPR) — A rating selected from a list of preferred values as given in Table 63.1 of ANSI/UL 1449 and assigned to each mode of protection. The value of the VPR is determined as the nearest highest value taken from Table 63.1 to the measured limiting voltage determined during the transient-voltage surge suppression test using the combination wave generator at a setting of 6 kV, 3 kA.

Mode(s) — Refers to the pair of electrical connections where the VPR applies. The term "ALL" indicates that the VPR applies to all combinations of pairs of electrical connections.

SPD Type Testing

Type 1 and 2 SPDs are subjected to a Nominal Discharge Current test where an 8 x 20 μ s surge current (magnitude specified by the manufacturer) is impressed through the SPD.

Type 3 SPDs are subjected to an Operating Duty Cycle test with a combination wave at 6 kV/3 kA.

PRODUCT MARKINGS

The following information is marked on Type 1, 2 and 3 SPDs:

Electrical ratings, including the operating voltage rating (volts), ac power frequency (Hz) and number of phases or dc. For a two-port SPD, the ratings include the load current rating (amperes).

Voltage Protection Rating (VPR) in volts.

Nominal Discharge Current (I_n) Rating in amps or kA — for Type 1 and 2 SPDs.

Maximum Continuous Operating Voltage Rating (MCOV) in volts — for Type 1 and 2 SPDs.

Short-circuit Current Rating (SCCR) in amps or kA — for Type 1 and 2 SPDs.

PV SPDs are marked, "For Use in Photovoltaic Systems Only," or the equivalent.

SPDs investigated for general dc applications may also be marked, "Suitable for Use in Photovoltaic Systems."

FACTORS NOT INVESTIGATED

The effect of the suppressor on connected loads, the effect of the suppressor on harmonic distortion of the supply voltage, and the adequacy of the suppression level to protect connected equipment from damage due to transient-voltage surges has not been investigated.

RELATED PRODUCTS

Cord-connected SPDs employing cord sets provided with leakage-current detection and interruption are covered under Cord Sets with Leakage-current Detection and Interruption (ELGN).

Cord-connected SPDs employing ground-fault circuit interrupters are covered under Ground-fault Circuit Interrupters (KCXS).

Cord-connected and direct-plug-in SPDs are not intended for use with medical, dental or health care facilities equipment.

Component SPDs (Type 4), including discrete components as well as component assemblies, are covered under Surge-protective Devices (VZCA2).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1449, "Surge Protective Devices" (3rd edition).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up

Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Surge Protective Device" (or "SPD").

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SURGE ARRESTERS OVER 1000 VOLTS (VZQK)

GENERAL

This category covers surge arresters rated over 1000 V ac, intended to repeatedly limit the voltage surges on 48 – 62 Hz power circuits and to afford protection against surge-related damage to wiring systems and/or to downstream equipment.

Surge arresters are categorized by their intended application and prescribed test requirements. These categories are station, intermediate, distribution heavy duty, distribution normal duty, and distribution light duty.

RELATED PRODUCTS

Surge-protective devices rated up to 1000 V are covered under Surge-protective Devices (VZCA).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate metal-oxide surge arresters in this category is ANSI/IEEE C62.11, "Metal-Oxide Surge Arresters for AC Power Circuits."

All other types of surge arresters in this category are investigated to IEEE C62.1, "Gapped Silicon-Carbide Surge Arresters for AC Power Circuits."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Surge Arrester," "Distribution Normal-duty Surge Arrester" or "Station Class Surge Arrester."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SURGE PROTECTORS AND ISOLATORS FOR USE ON CATHODICALLY PROTECTED SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (VZQO)

GENERAL

This category covers surge protectors and isolators used to provide ac grounding and dc blocking for cathodic protection of underground pipelines and similar installations in hazardous locations. They may also be used to minimize galvanic corrosion between structures of dissimilar metals.

These devices have been investigated for providing effective grounding-path characteristics as noted in Section 250-2(d) of ANSI/NFPA 70, "National Electrical Code" (NEC, 1999 edition). Additionally, these devices have been investigated for providing isolation of objectionable dc ground currents as noted in Section 250-6(e) of the NEC (1999 edition). Manufacturers of these devices provide installation instructions and maintenance information to assure proper installation and continuous protection of the equipment.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

SURGE PROTECTORS AND ISOLATORS FOR USE ON CATHODICALLY PROTECTED SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (VZQO)

420

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Surge Protector for Use in Hazardous Locations," "Overvoltage Protector for Use in Hazardous Locations," or "Polarization Cell Replacement Unit for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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SURFACE VEHICLE CABLE (VZSA)

BATTERY LEAD WIRE (VZSE)

GENERAL

This category covers single-conductor battery leads intended for use in internal-combustion-engine-powered industrial trucks and electric-battery-powered industrial trucks. The wire is rated 60, 75, 90 or 105°C (140, 167, 194 or 221 °F) and 30, 48, 60, 90 or 150 V dc.

PRODUCT MARKINGS

Battery lead wire is marked with the cable type and the manufacturer's name or other identification, conductor size, temperature rating and voltage rating.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2726, "Outline of Investigation for Battery Lead Wire."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Battery Lead Wire."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LOW-VOLTAGE BATTERY CABLE CLASSIFIED IN ACCORDANCE WITH SAE J1127 (VZSL)

GENERAL

This category covers low-voltage battery cable intended for use in surface vehicle electrical systems. The cable consists of a single insulated conductor and is rated 60 V dc (25 V ac), 80 or 125°C.

PRODUCT MARKINGS

Low-voltage battery cable is marked with the cable type and the manufacturer's name or other identification.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is SAE J1127, "Low Voltage Battery Cable."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

SURFACE VEHICLE CABLE (VZSA)

Low-voltage Battery Cable Classified in Accordance with SAE J1127 (VZSL)—Continued

LOW-VOLTAGE BATTERY CABLE IN ACCORDANCE WITH SAE J1127

Issue No.

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ON-BOARD CABLE (VZSR)

GENERAL

This category covers single-conductor or single, coaxial cable intended for the connection of components in an electric vehicle. The cable is rated 60, 75, 90 or 105°C (140, 167, 194 or 221°F), 300 or 600 V ac or dc, -30°C (-22°F), oil resistant, water resistant, and suitable for exposure to battery acid.

PRODUCT MARKINGS

On-board cable is marked with the catalog number, the manufacturer's name or other identification, conductor size, temperature rating and voltage rating. Optional markings may include "VW-1," "-40C," and one or more of the codes noted below to designate that the cable is suitable for a specific fluid or environmental exposure if the cable has been investigated for the specified rating.

Fluid or Environmental Exposure	Optional Marking Code
Sunlight	W
Gasoline	G
Ethanol blend	E
Diesel fuel	D
Power-steering fluid	S
Auto transmission fluid	T
Engine coolant	A
Brake fluid	B

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2733, "Outline of Investigation for Surface Vehicle On-Board Cable."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "On-board Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

STRUCTURED CABLING PROGRAMS (VZYY)

GENERAL

A structured cabling system is a field-assembled set of cabling and connectivity products that integrates the data, voice, video, and various management systems of a building (such as building automation systems, safety alarms, security access, energy systems, etc.).

Structured cabling systems are investigated under UL's Performance Verification Service, and the performance standards used in the investigation can be proprietary manufacturer standards, industry standards, or the UL XTR Structured Cabling Program (VZZL).

Performance Verification testing includes passive and/or active testing of the Permanent Link, Basic Link or Channel (system). Passive testing employs a reference signal that is transmitted through the system under test. Transmission performance of the system is investigated against the applicable performance standard. Active testing employs packets of 8-bit hexadecimal or binary formatted data, which is transmitted through the system under test, in order to detect the presence of bit errors in the data packet.

STRUCTURED CABLING PROGRAMS (VZYY)

These systems may be tested in a laboratory environment or in the field as installed cabling as described in the individual Structured Cabling Program categories.

The cabling and connectivity products contained in a structured cabling system may be supplied by one or more manufacturers.

Structured cabling systems are commonly referred to as "Solutions," and this terminology is used to identify systems that have been Verified for performance under the individual Structured Cabling Programs. Typical Solution configurations are defined as follows:

Permanent Link — A 90-meter horizontal run of cable terminating in a telecommunications outlet connector or either a transition point (TP) connector or consolidation point (CP) connector at one end and in a telecommunications cross connection at the other end. The total Solution length is 90 meters.

Basic Link — A 90-meter horizontal run of cable terminating in a telecommunications outlet connector or either a transition point (TP) connector or consolidation point (CP) connector at one end and in a telecommunications cross connection at the other end with 2-meter patch cords at each end. The total Solution length is 94 meters.

Channel — A 90-meter horizontal run of cable terminating in a telecommunications outlet connector or either a transition point (TP) connector plus a 5-meter patch cord or consolidation point (CP) connector plus a 5-meter patch cord at one end and in a telecommunications cross connection plus a 5-meter patch cord at the other end with 2-meter patch cords at each end. The total Solution length is 100 meters.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

UL XTR STRUCTURED CABLING PROGRAM (VZZL)

GENERAL

This category covers field-assembled structured cabling systems (referred to as "Solutions") whose signal transmission characteristics have been investigated in accordance with the UL XTR Structured Cabling Program.

The UL XTR Program investigates how a Solution's transmission performance affects live data as it interacts with active network components. Solutions investigated for performance under the UL XTR Program have been investigated for the expanded performance properties necessary to maintain true data throughput and component interoperability.

The UL XTR Test Program requires testing of the Solution's horizontal cable, patch cords and connecting hardware, as well as passive channel, active channel and expanded active channel testing.

ADDITIONAL INFORMATION

For additional information, see Structured Cabling Programs (VZYY) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is the UL XTR Specification.

Components used in the Solution are also required to be UL Listed for Safety and UL Verified for Performance in accordance with the Standards shown below:

Safety		
Component	Standard	Guide
Cable	ANSI/UL 444, "Communications Cables"	DUXZ
Connecting Hardware	ANSI/UL 1863, "Communications-Circuit Accessories"	DUXR
Patch Cords	ANSI/UL 1863	DUXR

Performance Verification

Component	Standard	Guide
Category 5e Cable	ANSI/TIA/ EIA-568-B.2, "Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components Revision of ANSI/ TIA/EIA-568-A"	DUXZ

STRUCTURED CABLING PROGRAMS (VZYY)

UL XTR Structured Cabling Program (VZZL)—Continued

Component	Standard	Guide
Category 6 Cable	ANSI/TIA/ EIA-568-B.2-1, "Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted Pair Cabling Components Addendum 1 - Transmission Performance Specifications for 4-Pair 100 Category 6 Cabling Addendum No. 1 to ANSI/TIA/ EIA-568-B.2"	DUXZ
Category 5e Connecting Hardware	ANSI/TIA/ EIA-568-B.2	DUXR
Category 6 Connecting Hardware	ANSI/TIA/ EIA-568-B.2-1	DUXR
Category 5e Patch Cords	ANSI/TIA/ EIA-568-B.2	DUXR
Category 6 Patch Cords	ANSI/TIA/ EIA-568-B.2-1	DUXR

UL MARK

The Verification Mark of UL on the Bill of Lading, the Bulk Shipment Certificate, or on UL's Certificate of Conformity Assessment is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "VERIFIED," the term "UL XTR Program," a control number, and the Solution name and part number. The Verification Mark (label) is not applied directly to Solutions that have been investigated for performance under the UL XTR Program, since these products are field assembled.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PROPRIETARY STRUCTURED CABLING PROGRAMS (VZZX)

GENERAL

This category covers field-assembled structured cabling systems (referred to as "Solutions") whose signal transmission characteristics have been investigated in accordance with proprietary manufacturer network cabling standards or industry standards.

Performance Verification testing includes passive and/or active testing of the Permanent Link, Basic Link or Channel. If the performance standard specifies active testing, the investigation will review how a Solution's transmission performance affects live data as it interacts with active network components. Solutions subjected to active testing have been investigated for the performance properties necessary to maintain true data throughput and component interoperability.

ADDITIONAL INFORMATION

For additional information, see Structured Cabling Programs (VZYY) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Components used in the Solution are also required to be UL Listed for Safety and UL Verified for Performance in accordance with the Standards shown below:

Safety		
Component	Standard	Guide
Cable	ANSI/UL 444, "Communications Cables"	DUXZ
Connecting Hardware	ANSI/UL 1863, "Communications-Circuit Accessories"	DUXR
Patch Cords	ANSI/UL 1863	DUXR

Performance Verification

PRODUCT CATEGORIES BY CATEGORY CODE

Proprietary Structured Cabling Programs (VZZX)–Continued

Component	Standard	Guide
Category 5e Cable	ANSI/TIA/ EIA-568-B.2, "Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components Revision of ANSI/ TIA/EIA-568-A"	DUZX
Category 6 Cable	ANSI/TIA/ EIA-568-B.2-1, "Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted Pair Cabling Components Addendum 1 – Transmission Performance Specifications for 4-Pair 100 Category 6 Cabling Addendum No. 1 to ANSI/TIA/ EIA-568-B.2"	DUZX
Category 5e Connecting Hardware	ANSI/TIA/ EIA-568-B.2	DUXR
Category 6 Connecting Hardware	ANSI/TIA/ EIA-568-B.2-1	DUXR
Category 5e Patch Cords	ANSI/TIA/ EIA-568-B.2	DUXR
Category 6 Patch Cords	ANSI/TIA/ EIA-568-B.2-1	DUXR

UL MARK

The Verification Mark of UL on the Bill of Lading, the Bulk Shipment Certificate, or on UL's Certificate of Conformity Assessment is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "VERIFIED," the name of the Performance Standard, a control number, and the Solution name and part number. The Verification Mark (label) is not applied directly to Solutions that have been investigated for performance under this category, since these products are field assembled.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SWIMMING POOL AND SPA EQUIPMENT (WABX)

USE

This category covers equipment for use with swimming pools, decorative pools, wading pools, therapeutic pools, and hot tubs and spas in accordance with Article 680 of ANSI/NFPA 70, "National Electrical Code" (NEC).

This category also covers self-contained hot tubs and spas, as well as cord-connected portable appliances for use with aboveground storable swimming pools, hot tubs and spas.

Information concerning the suitability of the equipment for use indoors or outdoors is given in the General Information Section for each individual category.

RELATED PRODUCTS

Ground-fault circuit interrupters intended for use with swimming pool equipment are covered under Ground-fault Circuit Interrupters (KCXS).

Suction fittings are covered under Suction Fittings for Swimming Pools, Wading Pools, Spas and Hot Tubs (SEBS).

Fountains covered by Article 680, Part E, of the NEC are covered under Architectural and Floating Fountains (AWEG).

Speakers intended for installation underwater in swimming pools are covered under Speakers (UEAY).

BLOWERS (WAGN)

USE AND INSTALLATION

This category covers equipment intended to introduce pressurized air into spas and hot tubs to create a hydromassage effect. They are intended for installation in accordance with Article 680 of ANSI/NFPA 70, "National Electrical Code."

These products are acceptable for both indoor and outdoor use unless marked otherwise. They are provided with an accessible pressure-wire connector for equipotential bonding during installation.

To avoid water contacting live electrical parts, these products are intended to be installed in accordance with the manufacturer's instructions and permanently mounted at least 12 in. above the overflow level of the spa or hot tub.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1563, "Electric Spas, Equipment Assemblies, and Associated Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Spa Blower," "Hot Tub Blower" or "Spa/Hot Tub Blower."

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CONTROLS (WAWU)

USE

This category covers controllers, timers, temperature-regulating equipment, etc., for control of equipment intended for use with swimming pools, hot tubs and spas. This category also covers control panels for use with equipment intended for water-play fountains and water playground areas, swimming pools and spas, or fountains with water in common with swimming pools.

These products are acceptable for both indoor and outdoor use unless marked "For Indoor Use Only."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1563, "Electric Spas, Equipment Assemblies, and Associated Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Spa Controller" or "Swimming Pool Controller," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

COVERS FOR SWIMMING POOLS AND SPAS (WBAH)

USE AND INSTALLATION

This category covers manual and power safety covers intended for use with swimming pools, spas and hot tubs, as well as covers of other than the safety type, as defined in ASTM F1346, "Standard Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs."

The ability of the manual or power safety cover to perform its intended function is dependent upon proper installation. Installation should be performed by a qualified installer using the manufacturer's instructions. Authorities Having Jurisdiction should be consulted before installation.

PRODUCT TYPES

Covers for Swimming Pools and Spas (WBAH)—*Continued*

Manual Safety Covers — A manual safety cover is a barrier that is manually placed over the water. It is intended to impede access to the contained body of water. It is provided with a means for removing significant levels of collected surface water.

Power Safety Covers — A power safety cover is a barrier that can be placed over the water area and removed with a motorized mechanism. It is intended to impede access to the contained body of water. It is provided with a means for removing significant levels of collected surface water. A power safety cover includes an operator that is covered under Swimming Pool and Spa Cover Operators, Electric (WDDJ).

Other Covers — A cover of other than the safety type, such as an energy conservation or a solar energy cover, is a cover that has been investigated in accordance with only the materials, manufacture and labeling requirements of ASTM F1346. Covers of this type are not intended to impede access to the contained body of water. Such covers are marked "This Is Not A Safety Cover."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ASTM F1346, "Standard Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY*]
IN ACCORDANCE WITH ASTM F1346-[issue date]
Control No.

* MANUAL SAFETY COVER, POWER SAFETY COVER or POOL COVER

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LUMINAIRES AND FORMING SHELLS (WBBD)**USE**

This category covers luminaires and forming shells for installation in accordance with Article 680 of ANSI/NFPA 70, "National Electrical Code" (NEC).

ACCESSORIES

This category also covers accessory devices and kits intended to be field installed for the purpose of modernizing a luminaire, such as to convert the luminaire from incandescent to LED technology. These accessories include instructions that identify the specific luminaire(s) for which the accessory is intended and that do not require special knowledge or skills beyond that normally required for user maintenance activities, such as lamp replacement. After installation of a certified accessory, the installed luminaire is expected to comply with the same requirements and perform in a comparable manner as a new luminaire, relative to safety risks.

REBUILT PRODUCTS

This category also covers dry-niche, wet-niche, and no-niche underwater luminaires for swimming pools that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt dry-niche, wet-niche, and no-niche underwater luminaires for swimming pools are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt dry-niche, wet-niche, and no-niche underwater luminaires for swimming pools are subject to the same requirements as new dry-niche, wet-niche, and no-niche underwater luminaires for swimming pools.

PRODUCT MARKINGS

Luminaires are marked to indicate their suitability for use in fresh water, sea water, or both. Luminaires marked as suitable for use in fresh water are also considered suitable for use in salt-treated water. Luminaires investigated for operation only while submerged in water are marked, where visible after installation, "CAUTION To reduce the risk of electric shock submerge before lighting" or the equivalent. Additional markings for specific types of luminaires are described below.

PRODUCT TYPES AND INSTALLATION

Dry-niche Underwater Luminaires for Swimming Pools and Spas — These luminaires have been investigated for permanent installation only in

Luminaires and Forming Shells (WBBD)—*Continued*

the wall of a swimming pool or field-fabricated spa unless accompanying installation instructions indicate suitability for installation in the bottom of a pool or spa. These luminaires have been investigated for installation with the top of the lens not less than 450 mm (18 in.) below the normal water level unless otherwise marked. These luminaires are designed for servicing from the rear in a passageway behind the pool or spa wall or, if mounted in the bottom of a pool or spa, in a tunnel underneath the pool or spa. The luminaire may include (1) a factory-installed length of flexible cord terminating in an attachment plug, and (2) an attachment-plug receptacle for connection of the branch-circuit conductors.

Wet-niche Underwater Luminaires for Swimming Pools and Spas — These luminaires, with the mating forming shell (luminaire housing), have been investigated for installation only in the wall of a swimming pool or field-fabricated spa unless accompanying installation instructions indicate suitability for installation in the bottom of a pool or spa. These luminaires have been investigated for installation with the top of the lens not less than 450 mm (18 in.) below the normal water level unless otherwise marked. These luminaires have been investigated for installation in a permanently installed forming shell (luminaire housing) in which the luminaire will be completely surrounded by water. These luminaires are marked to indicate the proper forming shells with which they have been investigated for use. These luminaires are provided with a factory installed, permanently attached flexible cord with an exposed length of not less than 3.6 m (12 ft). The flexible cord is confined in the forming shell by the luminaire and permits the luminaire to be removed from the forming shell and to be lifted to the pool or spa deck for servicing without lowering the water level or disconnecting the luminaire from the branch-circuit conductors. Luminaires with longer cords are available for installations where the junction box or splice enclosure is so located that a 3.6 m (12 ft) long cord will not permit luminaire removal from the forming shell and placement on the deck for servicing. To reduce the risk of product damage, any cord length in excess of that necessary for servicing should be trimmed from the supply end rather than stored in the forming shell.

Forming Shell (Housing) for Wet-niche Underwater Luminaires for Swimming Pools and Spas — These are structures designed to support a mating wet-niche luminaire, for mounting in a pool structure. Forming shells are marked to indicate the luminaires with which the forming shells have been investigated for use.

No-niche Underwater Luminaires for Swimming Pools and Spas — These luminaires have been investigated for mounting to a bracket permanently secured in or on the pool or spa wall or bottom where the luminaire will be completely surrounded by water, and are marked to indicate the mounting bracket for which they have been investigated for use. The information provided above for wet-niche luminaires regarding installation location and the provided flexible cord also applies to no-niche luminaires.

Mounting Brackets for No-niche Underwater Luminaires for Swimming Pools and Spas — These are structures designed to support a mating no-niche luminaire, for mounting in or on a pool structure. Mounting brackets are marked to indicate the luminaires with which the mounting brackets have been investigated for use.

Underwater Luminaires for Aboveground Storable Swimming Pools — These luminaires are a type of through-wall lighting assembly as described in Article 680 of the NEC. They have been investigated for use with an aboveground storable pool (a pool that is constructed on or above the ground and is capable of holding water to a maximum depth of 1.0 m (42 in.), or a pool with nonmetallic, molded polymeric walls regardless of dimension). They include all three of the following factory-provided parts:

1. Lamp assembly for temporary installation on or through the wall of an aboveground pool
2. Transformer or ground-fault circuit interrupter assembly provided with a 0.9 m – 1.8 m (3 – 6 ft) power-supply cord for connection to a source of supply and for temporary mounting away from the pool (the remote assembly)
3. Jacketed flexible cord of not less than 7.6 m (25 ft) in length connecting the lamp assembly and the remote assembly

These luminaires have been investigated for installation with the top of the lens not less than 200 mm (8 in.) below the top of the pool. A hole through the pool wall may be required for luminaire installation. Unless otherwise indicated in the luminaire's installation instructions, the luminaire design has been investigated for the lower edge of any hole that a luminaire installer must cut in the pool wall to be no more than 360 mm (14 in.) below the top of the pool wall. The pool wall manufacturer may provide, at a greater depth, a properly sized hole or a reinforced wall section designed for field-cutting a properly sized hole for a luminaire or plumbing fitting. Unless otherwise marked for a maximum installation depth, these luminaires have been investigated for installation in such a hole at a greater depth where the pool installation instructions provide for the hole placement and usage.

Underwater Luminaires for Aboveground Nonstorable Swimming Pools — These luminaires are a type of through-wall lighting assembly as

Luminaires and Forming Shells (WBBDT)—Continued

described in Article 680 of the NEC. They have been investigated for permanent installation through or on the wall of an aboveground nonstorable pool. The information provided above for underwater luminaires for aboveground storable swimming pools regarding installation depth and using an existing hole or cutting a new hole for installation also applies to underwater luminaires for aboveground nonstorable swimming pools.

Convertible Underwater Luminaires for Aboveground Swimming Pools — These luminaires are initially configured as an underwater luminaire for aboveground storable swimming pool for use as described above. They include provisions for the one-time field conversion of the luminaire to an underwater luminaire for aboveground nonstorable swimming pool for use as described above. Once converted, these luminaires are not suitable for being modified back to their original configuration.

Fiber Optic Luminaires for Swimming Pools and Spas — These luminaires consist of a lamp/electrical enclosure that has been investigated for permanent mounting not less than 1.5 m (5 ft) from the pool or spa wall and a fiber optic element and associated fittings to transmit the light to the pool or spa. The lamp/electrical enclosure has been investigated for installation above the level at which water splashed from the pool or spa or from another source may collect.

SUPPLY-CIRCUIT CURRENT RATING

An underwater luminaire for aboveground storable swimming pools has been investigated for connection to the branch circuit specified in the NEC for receptacles having a blade configuration corresponding to the blade configuration of the luminaire attachment plug. For all other luminaires, unless marked to identify a permitted greater or required lower maximum supply-circuit current rating, a luminaire with a voltage and current rating shown in the table below has been investigated for installation on a supply circuit rated not more than as specified in the table. A luminaire with a voltage or current rating not covered by the table is marked to identify the maximum supply-circuit current rating for its installation.

Maximum Current Rating for Supply Circuit (Except as Specified in Preceding Paragraph)

Luminaire Voltage Rating	Luminaire Current Rating	Max Current Rating for Luminaire Supply Circuit
15 V ac or less	25 A or less	25 A
110 V ac - 120 V ac	16 A or less	20 A
110 V ac - 120 V ac	More than 16 A, not more than 24 A	30 A

RELATED PRODUCTS

See Submersible Luminaires (IFEV) for underwater luminaires intended for use in fountains and similar water-containing vessels not intended to accommodate the complete or partial immersion of persons.

See Swimming Pool Junction Boxes (WCEZ) for junction boxes intended for use with wet-niche luminaires and their forming shells. See Swimming Pool and Spa Transformers (WDGV) for transformers for use to supply swimming pool and spa luminaires. See Potting Compounds (WCRY) for compounds for the user to encapsulate grounding and bonding conductor splices in swimming pool, spa or fountain equipment, including luminaires, forming shells and junction boxes.

ADDITIONAL INFORMATION

For additional information, see Swimming Pool and Spa Equipment (WABX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 676, "Underwater Luminaires and Submersible Junction Boxes."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate:

- "Dry-niche Underwater Luminaire for Swimming Pool"
- "Rebuilt Dry-niche Underwater Luminaire for Swimming Pool"
- "Wet-niche Underwater Luminaire for Swimming Pool"
- "Rebuilt Wet-niche Underwater Luminaire for Swimming Pool"
- "Forming Shell (or Housing) for Wet-niche Luminaire"
- "No-niche Underwater Luminaire for Swimming Pool"
- "Rebuilt No-niche Underwater Luminaire for Swimming Pool"
- "Mounting Bracket for No-niche Luminaire"
- "Underwater Luminaire for Aboveground Storable Swimming Pool"
- "Underwater Luminaire for Aboveground Nonstorable Swimming Pool"

Luminaires and Forming Shells (WBBDT)—Continued

- "Convertible Underwater Luminaire for Aboveground Swimming Pool"
- "Fiber Optic Luminaire for Swimming Pool"
- "Underwater Luminaire Accessory"

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HEATERS (WBRR)

USE

This category covers heaters intended for permanent installation in or adjacent to swimming pools or spas.

These products have not been investigated for outdoor use unless they are marked "For Outdoor Use," or equivalent, in which case they are acceptable for both outdoor and indoor use.

RELATED PRODUCTS

Heaters intended for use with hydromassage bathtubs are covered under Hydromassage Bathtubs (NCHX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1261, "Electric Water Heaters for Pools and Tubs."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Swimming Pool Heater" or "Spa Heater."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HOT TUB AND SPA EQUIPMENT ASSEMBLIES (WBYQ)

USE AND INSTALLATION

This category covers equipment assemblies intended for use with non-self-contained spas and hot tubs, rated 250 V or less, for household or commercial use indoors, outdoors, or both.

This category also covers equipment assemblies that do not contain a water heater and do not contain a water temperature-regulating control or a water temperature-limiting control. A water heater, a temperature-regulating control and a temperature-limiting control should be provided in the final installation and their adequacy determined by the Authority Having Jurisdiction.

Equipment assemblies may be cord-and-plug connected, convertible, or permanently wired. Convertible equipment assemblies are shipped from the factory with a power-supply cord but designed for field conversion to a permanently wired configuration, for 120 V, 240 V, or either rating. Once a convertible equipment assembly is converted to permanently wired, it is not intended to be returned to a cord-connected configuration.

Equipment assemblies are prepackaged combinations of various components, such as pumps, filters, heaters, blowers, lights and controls, and are designed for use with field-supplied tubs. Equipment assemblies are designed for installation and use in accordance with Article 680 of ANSI/NFPA 70, "National Electrical Code." Equipment assemblies should be installed at least 5 feet from the inside walls of a spa or hot tub and be connected by nonmetallic pipe only.

Equipment assemblies have not been investigated for below-grade installation.

Equipment assemblies have not been investigated for use within an outer enclosure or under the skirt of a spa or hot tub unless so marked.

Equipment assemblies that contain a gas-fired water heater have not been investigated for indoor use, for use within an outer enclosure, or for use under the skirt of a spa or hot tub unless so marked.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

Hot Tub and Spa Equipment Assemblies (WBYQ)–Continued

The basic standard used to investigate products in this category is ANSI/UL 1563, "Electric Spas, Equipment Assemblies, and Associated Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Equipment Assembly for Spa/Hot Tub," "Hot Tub Equipment Assembly" or "Spa Equipment Assembly."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SWIMMING POOL JUNCTION BOXES (WCEZ)

USE

This category covers junction boxes intended for use with underwater swimming pool and spa luminaires. The boxes are acceptable for both outdoor and indoor use.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1241, "Junction Boxes for Swimming Pool Luminaires."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Swimming Pool Junction Box."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

OZONE GENERATORS (WCKA)

USE AND INSTALLATION

This category covers ozone generators rated 600 V or less and intended for use in the treatment of nonpotable water in swimming pools, and in spas and hot tubs of other than the self-contained type.

These products have been found suitable for use in wet and damp locations as well as dry locations unless marked "For Use in Dry Locations Only."

These products have been investigated with respect to risk of electric shock, fire and mechanical injury only.

Ozone generators involve features of installation and use not ordinarily present in electrical utilization equipment. Such features are covered in the manufacturer's installation instructions. The installation is intended to be in accordance with the manufacturer's instructions furnished with the equipment and the requirements of the Authorities Having Jurisdiction.

Maximum ozone threshold limit recommendations are set by the American Conference of Governmental Industrial Hygienists as found in 21CFR801.415, "Maximum Acceptable Level of Ozone." Compliance with the applicable regulations under conditions of normal and abnormal operation has not been investigated.

ADDITIONAL INFORMATION

For additional information, see Swimming Pool and Spa Equipment (WABX), Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1563, "Electric Spas, Equipment Assemblies and Associated Equipment."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

Ozone Generators (WCKA)–Continued

OZONE GENERATOR WITH RESPECT TO RISK OF ELECTRIC SHOCK, FIRE AND MECHANICAL INJURY ONLY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SWIMMING POOL AND SPA EQUIPMENT CLASSIFIED IN ACCORDANCE WITH NSF 50 (WCNZ)

USE

This category covers pool and spa equipment, such as filters, centrifugal pumps, surface skimmers, ozone generators, chemical feeding equipment, chlorinators and other units installed in water circulation and filtration systems of pools, spas and hot tubs.

RELATED PRODUCTS

Some products covered under this category may also be covered under Water Treatment Equipment (WDLO), Swimming Pool and Spa Equipment, Miscellaneous (WDUT) or Pumps (WCSX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is NSF/ANSI 50, "Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT IDENTITY*]

IN ACCORDANCE WITH NSF/ANSI 50-[issue date]

Control No.

* **SWIMMING POOL FILTER, OZONE GENERATOR, SPA CHLORINATOR** or other appropriate product name as shown in the individual Classifications

For those products which are also Listed or Classified by UL under another category, the marking includes the appropriate Listing or Classification Mark and the statement "ALSO CLASSIFIED IN ACCORDANCE WITH NSF/ANSI 50-[issue date]."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

POTTING COMPOUNDS (WCRY)

USE

This category covers compounds intended to be used to encapsulate grounding and bonding conductor splices or terminations in swimming pool, spa or fountain equipment such as fixtures, fixture housings, and junction boxes where the splices or terminations may be exposed to salt-free swimming pool or fountain water and sunlight for varying lengths of time, including continuous exposure. This category also covers potting compounds used to fill underwater junction boxes.

These compounds have been investigated for their resistance to the deteriorating effects of salt-free swimming pool and fountain water and ultraviolet light. They have also been investigated for their ability to adhere to typical metals, such as copper alloy, stainless steel and to plastic. The container or package is marked to identify the materials to which the compound has been determined to suitably adhere.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 676A, "Outline of Investigation for Potting Compounds for Swimming Pool, Fountain, and Spa Equipment."

UL MARK

Potting Compounds (WCRY)—Continued

The Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Swimming Pool, Fountain and Spa Equipment Conductor Splice Potting Compound" (any of the locations may be omitted).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PUMPS (WCSX)

GENERAL

This category covers pumps for circulating the water in swimming pools, hot tubs and spas. These products are intended for installation in accordance with Article 680 of ANSI/NFPA 70, "National Electrical Code."

These products are acceptable for both outdoor and indoor use unless marked otherwise, and have been investigated for use with either permanently installed pools or storable pools.

Pumps investigated for permanently installed pools are so identified and are additionally marked "Do Not Use With Storable Pools." Permanently installed pool pumps are intended to be permanently connected to the water circulation system and they may be permanently wired or provided with a 3-ft nondetachable power-supply cord terminating in a grounding-type attachment plug. The attachment plug may be of the locking or non-locking type. Units provided with locking-type attachment plugs are intended to be installed at least 5 ft from the inside walls of the pool and are marked accordingly. Units provided with a nonlocking-type attachment plug are intended to be installed at least 10 ft from the inside walls of the pool and are marked accordingly. Permanently installed pool pumps are provided with an accessible pressure-wire connector for equipotential bonding.

Pumps investigated for storable pools are so identified and are additionally marked "Do Not Use With Permanently Installed Pools." Storable pool pumps are intended to be connected to a water circulation system constructed so that the pump may be readily disassembled from the system for storage and future reassembly to its original integrity. Storable pool pumps are provided with a minimum 25-ft nondetachable power-supply cord terminating in a grounding-type attachment plug, are double insulated, have no accessible grounded metal parts, have inaccessible noncurrent-carrying metal parts connected to the grounding conductor of the supply cord, and do not have an equipotential bonding connector.

These pumps may be provided with integral filters. The suitability of the filters to clean water has not been determined.

REBUILT PRODUCTS

This category also covers pumps that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt pumps are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt pumps are subject to the same requirements as new pumps.

RELATED PRODUCTS

Filters investigated to NSF/ANSI 50, "Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs," are covered under Swimming Pool and Spa Equipment Certified in Accordance with NSF 50 (WCNZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1081, "Swimming Pool Pumps, Filters, and Chlorinators."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Swimming Pool Pump," "Spa Pump" or "Swimming Pool or Spa Pump," or other appropriate product name as shown in the individual Listings.

For rebuilt products, the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

Pumps (WCSX)—Continued

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SELF-CONTAINED SPAS (WCZW)

USE AND INSTALLATION

This category covers self-contained spas for aboveground use, for household or commercial use, and for both indoor and outdoor use, unless marked otherwise. These spas are not designed or intended to have the water drained after each use. They are intended for installation in accordance with Article 680 of ANSI/NFPA 70, "National Electrical Code."

A self-contained spa is a continuous-duty appliance in which all control, water-heating and water-circulating equipment is an integral part of the product, located entirely under the spa skirt.

Self-contained spas may be cord connected, convertible, or permanently wired. A convertible spa is shipped from the factory with a power-supply cord but is designed for field conversion to a permanently wired configuration, either 120 V, 240 V, or both. Once a convertible spa is converted to permanently wired, it is not intended to be returned to a cord-connected configuration.

Self-contained spas may be provided with electric or gas heaters. Spas with gas heaters are intended for permanent wiring and permanent installation, and are intended for outdoor use only.

Each spa is provided with a marking on the wiring diagram in the field-wiring compartment or in the installation instructions or on a separate configuration sheet, to identify the major components of the spa when manufactured. The configuration sheet and the installation instructions are intended to be available during installation and inspection.

Self-contained spas may be shipped completely assembled or in knock-down form.

Knockdown spas are packaged by major component in multiple cartons to aid in shipping. They consist of a completely assembled and plumbed tub and an equipment package. The skirt may be attached to the tub or it may be provided in prefabricated sections for assembly in the field. The equipment package is completely assembled, pre-wired and plumbed. Connections are made by union fittings or similar quick-disconnect plumbing that does not require tools or special materials. All cartons used to ship a knock-down spa are marked to indicate the contents, the spa model, and the total number of required cartons.

Self-contained spas are provided with skimmers and/or suction fittings such that the completed spa complies with the material requirements, physical testing, hair entrapment and body entrapment test requirements of ANSI/ASME A112.19.8b (2009), "Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs."

RELATED PRODUCTS

Hydromassage bathtubs are covered under Hydromassage Bathtubs (NCHX).

Factory-made assemblies of pumps, heaters, blowers, lights and controls intended for use with field-supplied hot tubs and spas are covered under Hot Tub and Spa Equipment Assemblies (WBQ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1563, "Electric Spas, Equipment Assemblies, and Associated Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Self Contained Spa."

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SWIMMING POOL AND SPA COVER OPERATORS, ELECTRIC (WDDJ)

USE AND INSTALLATION

This category covers electrically driven cover operators intended for use with swimming pools and spas, together with controls for use with such operators. The cover operators generally consist of a motor-driven apparatus used to move the covering material. These operators are intended to be installed in accordance with Article 680 of ANSI/NFPA 70, "National Electrical Code." These products have been found suitable for both indoor and outdoor use.

SWIMMING POOL AND SPA EQUIPMENT (WABX)

Swimming Pool and Spa Cover Operators, Electric (WDDJ)—Continued

RELATED PRODUCTS

Some products covered under this category may incorporate pool covers certified under Covers for Swimming Pools and Spas (WBAH). Unless certified as a power safety cover under WBAH, a cover provided with the operator has not been investigated as a safety cover.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2452, "Outline of Investigation for Electric Swimming Pool and Spa Cover Operators."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Swimming Pool Cover Operator," "Spa Cover Operator" or "Pool Cover Operator."

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SWIMMING POOL AND SPA TRANSFORMERS (WDGV)

USE

This category covers field-installed, air-cooled swimming pool and spa transformers and dc-output power supplies of the isolated two-winding type having a grounded metal barrier between the primary and secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, "National Electrical Code." The input is rated a nominal 120 V; the secondary is rated 15 V ac or less or 30 V dc or less and 1000 VA or less.

These products are provided with a power-supply cord or have provisions for conduit connection to the branch-circuit supply. Transformers not provided with a power-supply cord are provided with leads or with studs or terminal pads to which certified pressure-wire connectors can be factory or field installed to accommodate field wiring. Wire-binding screws or studs with cupped washers should be used for copper wire 10 AWG max.

Transformers provided with a power-supply cord are intended for supplying low-voltage submersible (fountain) luminaires as indicated by a marking on the transformer. They are not intended for use with a swimming pool or spa luminaires.

Unless marked otherwise, these transformers are not suitable for connection to a conduit which extends directly to a wet-niche or no-niche luminaire.

These products have not been investigated for outdoor use, unless marked "For Outdoor Use" or equivalent, in which case they are acceptable for both outdoor and indoor use.

ADDITIONAL INFORMATION

For additional information, see Swimming Pool and Spa Equipment (WABX), Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 379, "Outline of Investigation for Transformers for Fountain, Swimming Pool, and Spa Luminaires."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Fountain Transformer," "Swimming Pool Transformer," "Spa Transformer" or "Fountain, Swimming Pool or Spa Transformer."

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WATER TREATMENT EQUIPMENT (WDLC)

USE AND INSTALLATION

SWIMMING POOL AND SPA EQUIPMENT (WABX)

Water Treatment Equipment (WDLC)—Continued

This category covers chlorinators, brominators, ozone generators, ion generators, and similar equipment intended to sanitize water in pools, spas and hot tubs. This category also covers equipment designed to monitor water chemistry in pools, spas and hot tubs, with or without the capability of adding chemicals to the water to adjust water chemistry. These products are intended for installation in accordance with Article 680 of ANSI/NFPA 70, "National Electrical Code."

These products are acceptable for both indoor and outdoor use unless marked otherwise. They are provided with an accessible pressure-wire connector for equipotential bonding during installation.

FACTORS NOT INVESTIGATED

The ability of this equipment to sanitize pool and spa water has not been investigated.

RELATED PRODUCTS

Equipment investigated for sanitation is covered under Pool and Spa Equipment Certified in Accordance with NSF 50 (WCNZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1081, "Swimming Pool Pumps, Filters, and Chlorinators," and ANSI/UL 1563, "Electric Spas, Equipment Assemblies, and Associated Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Swimming Pool Chlorinator," "Spa Chlorinator" or "Swimming Pool and Spa Chlorinator," or other appropriate product name as shown in the individual Listings.

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SWIMMING POOL AND SPA EQUIPMENT, MISCELLANEOUS (WDUT)

GENERAL

This category covers accessory equipment for swimming pools, hot tubs and spas, such as valves and pool cover drain pumps.

This category also covers swimming pool equipotential bonding kits intended to provide an intentional conductive bond to the pool water in accordance with Section 680.26.(C) of ANSI/NFPA 70, "National Electrical Code."

Unless marked otherwise, these products are acceptable for both indoor and outdoor use.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1563, "Electric Spas, Equipment Assemblies, and Associated Equipment," and ANSI/UL 1081, "Swimming Pool Pumps, Filters and Chlorinators."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Pool Cover Operator," "Pool Valve Actuator" or "Pool Freeze Protector," or other appropriate product name as shown in the individual Listings.

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SUCTION FITTINGS FOR SWIMMING POOLS, WADING POOLS, SPAS AND HOT TUBS (WEBS)

USE AND INSTALLATION

This category covers suction fittings intended for use in swimming pools, wading pools, in-ground and self-contained spas, hot tubs, and similar installations.

These fittings have been investigated for resistance to hair, body, finger and limb entrapment.

Suction fittings have been investigated for both indoor and outdoor use. They are intended to be installed following the instructions that are packaged with each fitting.

Self-contained spa fittings are intended only for installation in self-contained, factory-produced spas. They are intended for plumbing with at least two fittings per pump.

RATINGS

Each suction fitting is marked with a water-flow rate in gallons per minute. This rate must equal or exceed the maximum flow rate of the pump(s) used in the water circulating system.

PRODUCT MARKINGS

These fittings are marked with the intended installation position: "Wall Only," "Floor Only" or "Wall or Floor." They may additionally be marked with the statement, "For Single or Multiple Drain Use," "For Single Drain Use" or "For Multiple Drain Use Only."

Self-contained spa fittings are marked "For Use in Self-Contained Factory Manufactured Spas Only" and "For Multiple Outlet Use Only."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/APSP-16 (2011), "Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs."

Note: Fittings complying with ANSI/APSP-16 are also considered to comply with ANSI/ASME A112.19.8b (2009), "Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Swimming Pool Suction Fitting" (or "Sw Pool Sctn Ftn").

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SWITCHBOARDS (WEIR)

SWITCHBOARDS, DEAD-FRONT (WEVZ)

GENERAL

This category covers dead-front switchboards rated 600 V or less. Switchboards are large single panels, structural frames or assemblies of panels or structural frames on which may be mounted, on the face or back or both: switches, overcurrent, and other protective devices, buses, and instruments. Switchboards may be accessible from the rear as well as from the front and are not intended to be installed in cabinets.

A **switchboard section** is that portion of a switchboard which is prevented by the structural framework from being physically separated into smaller units. Framework that is welded or joined with steel rivets over 1/4 in. in diameter is considered to constitute a single section.

A **switchboard enclosure** is intended to enclose one or more switchboard sections or switchboard interiors, or is intended to provide auxiliary wiring space for an adjacent switchboard section.

A **switchboard interior** is intended to be field installed in a switchboard enclosure to become the equivalent of a dead-front switchboard section.

USE, INSTALLATION AND RATINGS

Electrical Ratings

Each switchboard section is marked with the current rating of the supply bus. Within a group of sections, a through or splice bus is not required to be marked with its rating. The ampacity of the through bus and supply bus supplying the next section may be reduced but should not be less than the supply rating of the next section. The current rating of the through and

Switchboards, Dead-front (WEVZ)—Continued

splice bus in the last section of a group (which might be used in the future to supply an additional section) is shown in the switchboard section marking if the through or splice bus rating is less than the supply rating of that section. The current rating of the section bus is also included in the marking. The adequacy of the supply, through, splice, or section bus current rating with respect to the calculated load current using the appropriate diversity factors noted in Section 230.42 and Article 220 of ANSI/NFPA 70, "National Electrical Code" (NEC), can only be determined by the Authority Having Jurisdiction (AHJ) at the final installation.

Short-circuit Ratings

Dead-front switchboard sections or interiors are marked with their short-circuit-current rating in rms symmetrical amps. The marking states that short-circuit ratings are limited to the lowest short-circuit rating of (1) any switchboard section connected in series, or (2) the lowest interrupting rating of any device installed or intended to be installed therein. However, for combination series-connected devices, the short-circuit-current rating marked on the switchboard may be higher than the interrupting rating of a specific circuit breaker installed or intended to be installed in the switchboard. This higher rating is valid only if the specific overcurrent devices identified in the marking are used within or ahead of the switchboard in accordance with the marked instructions. In many cases the short-circuit ratings are associated with instructions for securing supply wiring within the switchboard.

Service Equipment

The marking "Suitable for Use as Service Equipment" appears on each switchboard section or switchboard interior containing one or more service disconnects optionally intended for use at a service.

A switchboard section or interior marked for use at services as indicated above may also be used to provide the main control and means of cutoff for a separately derived system or a separate building.

A switchboard section or interior intended for use with multiple sources of supply and marked "Service Equipment" is provided with a means to disconnect load conductors from all sources of supply terminated in that section. Multiple-section switchboard assemblies intended for use with multiple sources may not be provided with a means to disconnect from all sources of supply; alternate nonservice sources may terminate in a nonservice-rated section. Only disconnects provided in sections marked "Service Equipment" have been investigated as being suitable for use as a means to disconnect and isolate load conductors from the source of supply.

Some switchboard sections or interiors incorporate neutrals factory bonded to the enclosure. Such units are marked "Suitable Only for Use as Service Equipment."

Some switchboards may have terminals or provisions for terminals, marked as taps, located on the supply side of the service disconnecting means. The suitability of these terminals as taps connected on the supply side of the service disconnect is intended to be determined in accordance with the NEC.

Ground-fault Protection

Some switchboard sections may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected are identified by a marking such as on a wiring diagram or on the relaying equipment. Instructions are provided for on-site testing of the ground-fault protection at the time of installation.

Overcurrent Protection

Where in normal operation the load will continue for three hours or more, molded-case circuit breakers and fused switches other than fused power circuit devices should not be loaded to exceed 80% of their current rating unless the device is otherwise marked. Low-voltage ac power switching devices (see PAPU) and fused power circuit devices (see IYSR) used in switchboards are suitable for continuous use at 100% of their rating.

Field-installed Equipment

A switchboard section or interior may have provision for field installation of additional suitable equipment such as branch, splice or through buses, meter socket bases, circuit breakers, switches, panelboards, and terminal connectors. The switchboard section or interior is marked with the name or trademark of the manufacturer and the catalog number or equivalent of such equipment that is intended to be installed in the field. A switchboard section or interior may also have provision for utility-installed current transformers and metering equipment.

Installation

A switchboard section or enclosure investigated to determine that it is rainproof is marked "Type 3R" and may also be marked "Rainproof."

A section or enclosure suitable for connection to a busway is marked to indicate the manufacturer and type of busway.

The acceptability of conduit stubs serving unit sections, with respect to wiring space and spacing from live parts, can be determined only by the AHJ at the final installation.

In some cases, field drilling of holes in the ground bus may be needed to add additional grounding terminals.

Field Terminations

Switchboards, Dead-front (WEVZ)—Continued

Dead-front switchboard sections covered under this category are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Aluminum conductors may be used if such marking is independent of any marking on terminal connectors and if it appears on a wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14 – 1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger, as specified in Table 310.16 of the NEC. Termination provisions are determined based on values provided in Table 310.16, with no adjustment made for correction factors.

Switchboards may have terminals or provisions for terminals located on the supply side of the service disconnecting means. These terminals or provisions for terminals are marked “TAP,” and the switchboard is marked to indicate the specific terminals or terminal kits intended to be field installed. The suitability of equipment connected to these taps is to be determined in accordance with NEC Sections 230.46, 230.82, 690.64(A), 701.11(E) and 705.12 by the AHJ at the final installation.

RELATED PRODUCTS

Single panels or groups of panel units designed for assembly in the form of a single panel, including buses and automatic overcurrent devices, and equipped with or without switches for the control of light, heat, or power circuits; designed to be placed in a cabinet or cutout box placed in or against a wall, partition, or other support; and accessible only from the front are covered under Panelboards (QEUY).

Theater switchboards, incandescent lighting switchboards with dimmers, and laboratory switchboards are covered under Switchboards, Special Purpose (WFJX).

Distribution equipment, the sole function of which is the automatic or nonautomatic transferring of one or more load conductor connections from one power source to another, is covered under Transfer Switches (WPTZ).

Factory-wired assemblies of industrial control equipment intended to control industrial processes are covered under Industrial Control Panels (NITW).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 891, “Switchboards.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Dead Front Switchboard Section,” “Switchboard Interior” or “Switchboard Enclosure.” The Listing Mark for dead-front switchboard sections includes the statement “___ of ___.” The first space is stamped with a number indicating the position that the section occupies in the series of sections constituting the switchboard. The second space is stamped with the total number of sections in the switchboard (including sections not bearing a UL Listing Mark).

The Listing Mark covers only the section so marked; it does not cover other sections included in the complete switchboard.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SWITCHBOARDS, SPECIAL PURPOSE (WFJX)

USE, INSTALLATION AND MARKINGS

This category covers theater switchboards, incandescent lighting switchboards with dimmers, and laboratory switchboards rated 600 V or less.

These switchboards are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14–1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger, as specified in Table 310.16 of ANSI/NFPA 70, “National Electrical Code.” Termination provisions are determined based on values provided in Table 310.16, with no adjustment made for correction factors.

Short-circuit Rating

Switchboards, Special Purpose (WFJX)—Continued

Special purpose switchboards are marked with their short-circuit-current rating in rms symmetrical amps. The marking states that short-circuit ratings are limited to the lowest interrupting rating of any device installed or intended to be installed therein. However, for combination series-connected devices, the short-circuit-current rating marked on the switchboard may be higher than the interrupting rating of a specific circuit breaker installed or intended to be installed in the switchboard. This higher rating is valid only if the specific overcurrent devices identified in the marking are used within or ahead of the switchboard in accordance with the marked instructions. In the case of rack-type theater-dimming switchboards with removable modules, the rating may depend on the use of specific dimming modules. These dimming modules are marked on the switchboard. In many cases the short-circuit ratings are associated with instructions for securing supply wiring within the switchboard.

Duty Rating

Theater-dimming switchboards have been investigated to operate continuously at 100% of their marked input rating.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 891, “Switchboards.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Laboratory Switchboard,” “Theater Switchboard” or “Incandescent Lighting Switchboard,” or other appropriate product name as shown in the individual Listings.

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SWITCHES (WFXV)

PULLOUT SWITCHES, DETACHABLE TYPE (WGEU)

USE AND INSTALLATION

This category covers switches having detachable pullout heads, with or without fuseholders, for cartridge fuses. These switches may be enclosed or nonenclosed.

Nonenclosed switches are intended for use in other assemblies, such as panelboards, service equipment, or the like.

Enclosed pullout switches may contain meter sockets and/or neutral assemblies and contain more than one independent switch without connection between switches.

Some enclosed pullout switches incorporate neutrals that are factory bonded to the enclosure. Such switches are marked “Suitable Only for Use as Service Equipment.”

Enclosed pullout switches marked for use as service equipment may also be used to provide the main control and means of cutoff for a separately derived system or for a second building.

Class CTL pullout switches have the physical size, configuration or other means which, in conjunction with the physical means provided in a Class CTL assembly, are designed to prevent the installation of more switch poles than that number for which the assembly is designed and rated.

Class CTL pullout switches may be identified by the words “Class CTL” or “CTL” on the switch as part of the marking.

Enclosed pullout switches that are rain-tight or rainproof are marked accordingly.

These pullout switches are intended for use with copper conductors unless marked to indicate that certain terminals are suitable for use with aluminum conductors. Such markings are independent of any marking on the terminal connectors and appear on a wiring diagram or other readily visible location.

Unless a switch is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14 – 1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger as specified in Table 310.16 of ANSI/NFPA 70, “National Electrical Code.” Termination provisions are determined based on values provided in Table 310.16, with no adjustment made for correction factors.

RATINGS

Ratings of enclosed or nonenclosed pullout switches are limited to 600 V or less, 400 A or less.

PRODUCT CATEGORIES BY CATEGORY CODE

Pullout Switches, Detachable Type (WGEU)—Continued

Switches without fuseholders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Fused pullout switches are marked "Continuous load current not to exceed 80 percent of the rating of fuses employed in other than motor circuits."

Pullout switches with horsepower ratings in addition to amp ratings are suitable for use in motor circuits as well as for general use. Pullout switches with amp ratings only are suitable for general use only.

Pullout switches rated higher than 100 hp are restricted to use as motor disconnecting means and are not intended for use as motor controllers.

Motor-circuit pullout switches are intended for use only in motor circuits and are marked "Motor-Circuit Pullout Switch."

Horsepower ratings are associated with particular voltages and number of phases. A horsepower-rated switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Some pullout switches have dual horsepower ratings, the larger of which is based on the use of fuses with time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Switches marked "Suitable For Use On A Circuit Capable of Delivering Not More Than ___ Amps, RMS, Symmetrical, ___ Volts Maximum: Use Class ___ Fuses Having An Interrupting Rating Of No Less Than The Maximum Available Short-Circuit Current Of The Circuit," have been investigated for the additional rating indicated.

Some enclosed pullout switches are suitable for use as service switches. Such switches are marked "Suitable For Use As Service Equipment."

Enclosed pullout switches with the neutral bonded to the frame or enclosure at the factory are marked "Suitable Only for Use as Service Equipment."

RELATED PRODUCTS

Products with similar uses are covered under Switches, Enclosed (WIA), Motor Controllers, Manual (NLRV), Switches, Dead-front (WHXS) and Switches, Open Type (WHTY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1429, "Pullout Switches."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Pullout Switch," "Enclosed Pullout Switch," "Motor Circuit Pullout Switch" or "Enclosed Motor Circuit Pullout Switch."

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SWITCHES, AUTOMATIC (WGLT)**Switches, Clock Operated (WGZR)****GENERAL**

This category covers mechanically driven, clock-operated switches (timers). These devices are actuated by clockwork, by a gear train, by electrically wound spring motor, or the equivalent. The switching circuit includes separable contacts (air gap).

This category does not cover electronic timers or electronic solid-state switching devices.

Clock-operated switches may be marked with the following:

Manufacturer's name, trademark or identifier (visible after installation)
Model number (visible after installation)
Factory code (if the device is produced at more than one location)
Electrical ratings, including: volts, hertz, amps, load type (visible after installation)

Lamp load maximum ratings are indicated or is one-tenth of the full amp rating

Electrical loads, when applicable, are indicated as follows:

"Tungsten" (or "T") for tungsten-filament-lamp loads
"Resistance only" (or "R") for noninductive resistance loads
"Inductive" (or "H") for inductive loads, such as IT equipment and appliances
"Pilot duty" (or "PD") for magnet-coil loads

Switches, Clock Operated (WGZR)—Continued

Clock-operated switches marked "Replace with Type HPN cord only" are suitably rated for SP-2 replacement cord

Permanently connected devices may be marked as follows:

Terminals are identified so that it is obvious how to connect the conductors or correspond to the wiring diagram (provided with the device).

"For supply connections, use ___ AWG or larger wire suitable for at least ___°C (___°F)," or equivalent. If no wire size is provided, 14 AWG was used; if no temperature is provided, 60°C wire was used.

"AL" or "Use aluminum wire only" identifies terminals for aluminum supply wire only.

"CU" or "Use copper wire only" identifies terminals for copper supply wire only.

"CU-AL" or "AL-CU" or "Use copper or aluminum wire" identifies terminals for copper or aluminum supply wire.

"Use copper wire only except at terminals ___" identifies a specific terminal wired to a conductor other than copper. Identification of specific terminals is required.

RATINGS

Clock-operated switches are rated for ac, dc, or both, and may be rated up to 600 V.

RELATED PRODUCTS

Appliance switches investigated to ANSI/UL 61058-1, "Switches for Appliances - Part 1: General Requirements," and special-use switches investigated to ANSI/UL 1054, "Special-Use Switches," are covered under Switches, Appliance and Special Use (WOYR).

General-use snap switches or flush-mounted switches installed in a wiring system per ANSI/NFPA 70, "National Electrical Code," are covered under Switches, Surface (WOKT) and Switches, Flush (WMUZ), respectively.

Manual motor controllers are covered under Motor Controllers, Manual (NLRV).

Switches for industrial applications are covered under Power Circuit and Motor-mounted Apparatus (NMTR).

Nonindustrial photoelectric switches for lighting control and/or motion-sensitive switches intended for nonindustrial applications are covered under Switches, Photoelectric (WJCT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 917, "Clock-Operated Switches."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Clock Operated Switch" or "Timer Switch."

The Listing Mark for this category requires the use of a holographic label.

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SWITCHES, OPEN TYPE (WHTY)**USE AND INSTALLATION**

This category covers open-type switches without an enclosure that are provided with a handle operator. These switches may be provided with fuseholders for plug- or cartridge-type fuses. These switches are intended for installation in a panelboard, switchboard, motor control center, industrial control panel or the like, or for installation in a certified cabinet or a cutout box in accordance with the switch installation instructions, or without an enclosure where acceptable.

These switches are intended to be mounted in enclosures such that they are manually operable by means of an external handle without opening the enclosure. Externally-operated handles mounted to the sidewall of an enclosure or through the cover of an enclosure are intended to be installed in accordance with the switch installation instructions. Open-type switches may be factory or field installed, and minimum enclosure size provided with the switch installation instructions may not incorporate the space necessary for the deflection of conductors entering or leaving the enclosure. The need for, and adequacy of, wire-bending space at terminals should be determined at the time of installation.

These switches are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Switches, Open Type (WHTY)—Continued

Unless a switch is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14 – 1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger as specified in Table 310.16 of ANSI/NFPA 70, “National Electrical Code.” Termination provisions are determined based on values provided in Table 310.16 or Section 310.15(B)(6), with no adjustment made for correction factors.

RATINGS

Switches without fuseholders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Fused switches are marked “Continuous load current not to exceed 80 percent of the rating of fuses employed in other than motor circuits.”

Ratings of certified open-type switches are limited to 4000 A, 500 hp, 600 V. Open-type switches rated at more than 1200 A at 250 V or less, and switches rated at more than 600 A at more than 250 V are available in two classes, one intended for general use and the other intended for isolating use only. Switches intended for isolating use only are marked “For Isolating Use Only – Do Not Open Under Load.”

Open-type switches with horsepower ratings in addition to ampere ratings are suitable for use in motor circuits as well as for general use. Open-type switches with ampere ratings only are intended for general use only. Open-type motor circuit switches are intended for use only in motor circuits and are marked “Motor-Circuit Switch.”

Open-type switches rated higher than 100 hp are restricted to use as motor disconnecting means and are not for use as motor controllers.

Ratings of certified open-type motor circuit switches are limited to 500 hp, 600 V.

Horsepower ratings are associated with particular voltages and number of phases. A switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Some open-type switches have dual horsepower ratings, the larger of which is based on the use of fuses with a time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Switches are marked with their short-circuit current rating(s) in rms symmetrical amps.

RELATED PRODUCTS

Products with similar uses are covered under Switches, Enclosed (WIA), Switches, Molded Case (WJAZ), Motor Controllers, Manual (NLRV), Pullout Switches, Detachable Type (WGUE), Switches, Knife (WIOV) and Switches, Dead-front (WHXS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 98A, “Outline of Investigation for Open-Type Switches.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Open Type Switch” or “Open Type Motor-Circuit Switch.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SWITCHES, OPEN TYPE FOR USE IN PHOTOVOLTAIC SYSTEMS (WHVA)

USE AND INSTALLATION

This category covers open-type switches without an enclosure that are provided with a handle operator intended for use in photovoltaic (PV) systems. These switches may be provided with fuseholders for PV fuses and may be electrically tripped. These switches are intended for installation in a panelboard, switchboard or the like, or for installation in a certified cabinet or a cutout box in accordance with the PV switch installation instructions and Article 690 of ANSI/NFPA 70, “National Electrical Code” (NEC).

Open-type PV switches are intended for use in ambient temperatures between -20 and 50°C.

Open-type unfused PV switches are rated for continuous operation at their marked ampere rating.

Open-type fused PV switches are intended only for use with PV fuses and are rated for continuous load current not to exceed 80% of the maximum ampere rating of the PV fuse marked for use with the device.

Switches, Open Type for Use in Photovoltaic Systems (WHVA)—Continued

These open-type switches are intended to be mounted in enclosures such that they are manually operable by means of an external handle without opening the enclosure. Externally-operated handles mounted to the side-wall of an enclosure or through the cover of an enclosure are intended to be installed in accordance with the open-type switch installation instructions. Open-type switches may be factory or field installed, and minimum enclosure size provided with the switch installation instructions may not incorporate the space necessary for the deflection of conductors entering or leaving the enclosure. The need for, and adequacy of, wire-bending space at terminals should be determined at the time of installation.

These open-type switches are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless an open-type switch is marked to indicate otherwise, the termination provisions are based on the use of 75°C ampacities as specified in Table 310.15(B)(16) of the NEC. Termination provisions are determined based on values provided in Table 310.15(B)(16) or Section 310.15(B)(2) of the NEC.

PRODUCT MARKINGS

Open-type PV switches are marked with the maximum electrical ratings, including a voltage rating up to 1000 V dc maximum, current rating, and short-circuit-current rating.

Open-type PV switches are marked “Photovoltaic” or “PV Disconnect Switch” and may, in addition, be marked “Suitable for Use in Photovoltaic Systems in Accordance with Article 690 of the NEC.”

Multipole open-type PV switches not intended for individual circuits on each pole are marked with a diagram or other verbiage detailing the correct electrical connections.

Open-type PV switches are marked for use with 75°C copper and/or aluminum conductors, the allowable wire range, and wire type.

Open-type PV switches are marked “-20 to 50°C.”

Open-type fusible PV switches are marked “This switch is suitable for use in a PV system capable of delivering not more than ___ amperes, when protected by ___ PV fuses [type and manufacturer] rated ___ amperes maximum” (or the equivalent).

Open-type PV switches that do not isolate the fuseholders are marked “WARNING – ELECTRICAL SHOCK HAZARD. THIS SWITCH DOES NOT DE-ENERGIZE BOTH THE LINE AND LOAD SIDE OF THE FUSE-HOLDERS WHEN IN THE OPEN POSITION” (or the equivalent).

RELATED PRODUCTS

See Switches, Enclosed (WIA), Switches, Dead-front for Use in Photovoltaic Systems (WHXX) and Switches, Enclosed for Use in Photovoltaic Systems (WIBC).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 98A, “Outline of Investigation for Open-Type Switches,” and UL Subject 98B, “Outline of Investigation for Enclosed and Dead-Front Switches for Use in Photovoltaic Systems.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Open-type Photovoltaic Switch” (or “Open-type PV Switch”).

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SWITCHES, DEAD-FRONT (WHXS)

USE AND INSTALLATION

This category covers dead-front switches having all current-carrying parts enclosed when mounted in an enclosed panelboard, dead-front switchboard or the like. These switches may be provided with fuseholders for plug- or cartridge-type fuses. These switches are manually operable by means of external handles without opening the enclosure or are hinged pullout switches.

Switches without fuseholders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Fused switches are marked “Continuous load current not to exceed 80 percent of the rating of fuses employed in other than motor circuits.”

Switches, Dead-front (WHXS)—Continued

These switches are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless a switch is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14 – 1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger as specified in Table 310.16 of ANSI/NFPA 70, “National Electrical Code.” Termination provisions are determined based on values provided in Table 310.16, with no adjustment made for correction factors.

RATINGS

Ratings of certified dead-front switches are limited to 4000 A, 500 hp, 600 V. Dead-front switches rated 800 or 1200 A at more than 250 V at more than 1200 A at 250 V or less, and switches rated at more than 600 A at more than 250 V are available in two classes, one intended for general use and the other intended for isolating use only. Switches intended for isolating use only are marked “For Isolating Use Only — Do Not Open Under Load.”

Dead-front switches with horsepower ratings in addition to ampere ratings are suitable for use in motor circuits as well as for general use. Dead-front switches with ampere ratings only are intended for general use only.

Some hinged pullout switches achieve an “off” position only by leaving the door open. These switches are restricted to use only as a single main in a panel board or the like and are rated not higher than 200 A and 250 V.

Dead-front switches rated higher than 100 hp are restricted to use as motor disconnecting means and are not for use as motor controllers.

Enclosed motor-circuit switches are intended for use only in motor circuits and are marked “Motor-circuit Switch.”

Ratings of certified dead-front motor-circuit switches are limited to 500 hp, 600 V.

Horsepower ratings are associated with particular voltages and number of phases. A switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Some dead-front switches have dual horsepower ratings, the larger of which is based on the use of fuses with a time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Switches are marked with their short-circuit current rating(s) in rms symmetrical amps.

RELATED PRODUCTS

Switches mounted in an enclosure in which all current-carrying parts are enclosed and which are operable without opening the enclosure are covered under Switches, Enclosed (WIAX).

Switches that have blade-jaw-type construction where all blade joints are subject to high clamping pressure when the switch is closed by means of a bolt, cam or similar mechanical action (referred to as bolted-pressure contact switches), and switches that have butt-type contacts with a spring-charged mechanism (referred to as high-pressure butt-type contact switches) are covered under Fused Power Circuit Devices (IYSR).

Detachable-head pullout switches are covered under Pullout Switches, Detachable Type (WGEU).

Open-type knife switches are covered under Switches, Knife (WIOV).

Dead-front switches intended for use aboard marine vessels are covered under Switches, Enclosed, Marine (WIZZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 98, “Enclosed and Dead-Front Switches.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Dead-front Switch,” “Dead-front Motor-circuit Switch” or “Hinged Pullout Switch.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SWITCHES, DEAD-FRONT FOR USE IN PHOTOVOLTAIC SYSTEMS (WHXX)

GENERAL

This category covers dead-front switches having all current-carrying parts enclosed when mounted in a certified enclosure or as part of other certified equipment, for use in photovoltaic (PV) systems. These switches may be

Switches, Dead-front for Use in Photovoltaic Systems (WHXX)—Continued

provided with fuseholders for fuses. These switches are manually operable without opening the enclosure and are suitable for use as disconnects in accordance with Article 690 of ANSI/NFPA 70, “National Electrical Code” (NEC).

Dead-front PV switches are rated up to 1000 V maximum and are intended for use in ambient temperatures between -20 and 50°C.

Dead-front unfused PV switches are rated for continuous operation at their marked ampere rating.

Dead-front fused PV switches are intended only for use with PV fuses and are rated for continuous load current not to exceed 80% of the maximum ampere rating of the PV fuse marked for use with the device.

PRODUCT MARKINGS

Dead-front PV switches are marked with the maximum intended electrical ratings, including a voltage rating up to 1000 V dc maximum, current rating, and short-circuit interrupting rating.

Dead-front PV switches are marked “Photovoltaic” (or “PV”) and may, in addition, be marked “Suitable for Use in Photovoltaic Systems in Accordance with Article 690 of the NEC.”

Multipole dead-front PV switches not intended for individual circuits on each pole are marked with a diagram or other verbiage detailing the correct electrical connections.

Dead-front PV switches are marked for use with copper conductors only, the allowable wire range, and wire type.

Dead-front PV switches are marked “-20 to 50°C.”

Enclosed fusible PV switches are marked “This switch is suitable for use in a PV system capable of delivering not more than ___ amperes, when protected by ___ PV fuses [type and manufacturer] rated ___ amperes maximum,” or the equivalent.

Switches that do not isolate the fuseholders are marked as follows or the equivalent: “WARNING - ELECTRICAL SHOCK HAZARD. THIS SWITCH DOES NOT DE-ENERGIZE BOTH THE LINE AND LOAD SIDE OF THE FUSEHOLDERS WHEN IN THE OPEN POSITION.”

RELATED PRODUCTS

See Switches, Dead-front (WHXS) and Switches, Enclosed for Use in Photovoltaic Systems (WIBO).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 98B, “Outline of Investigation for Enclosed and Dead-Front Switches for Use in Photovoltaic Systems.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Dead-front Photovoltaic Switch” (or “Dead-front PV Switch”).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SWITCHES, ENCLOSED (WIAX)

USE AND INSTALLATION

This category covers enclosed switches and enclosed motor-circuit switches that are externally operable without opening the enclosure. These switches may be provided with fuseholders for plug- or cartridge-type fuses and may be electrically tripped.

These switches are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless a switch is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14 – 1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger as specified in Table 310.16 of ANSI/NFPA 70, “National Electrical Code.” Termination provisions are determined based on values provided in Table 310.16, with no adjustment made for correction factors.

RATINGS

Switches without fuseholders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Enclosed switches identified with an Enclosure Type designation are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Switches, Enclosed (WIAX)—Continued

Fused enclosed switches are marked “Continuous load current not to exceed 80 percent of the rating of fuses employed in other than motor circuits.”

Ratings of certified enclosed switches are limited to 4000 A, 500 hp, 600 V. Enclosed switches rated at more than 1200 A at 250 V or less, and switches rated at more than 600 A at more than 250 V are available in two classes, one intended for general use and the other intended for isolating use only. Switches intended for isolating use only are marked “For Isolating Use Only — Do Not Open Under Load.”

Enclosed switches with horsepower ratings in addition to amp ratings are suitable for use in motor circuits as well as for general use. Enclosed switches with amp ratings are intended for general use. Enclosed motor-circuit switches are intended for use only in motor circuits and are marked “Motor-circuit Switch.”

Double-throw switches that have been investigated for switching a common load from a normal supply to an optional standby system are marked “Suitable for Use in Accordance with Article 702 of the National Electrical Code” or “Suitable for Use in Accordance with NFPA 70.”

Enclosed switches rated higher than 100 hp are restricted to use as motor disconnecting means and are not intended for use as motor controllers.

Ratings of certified enclosed motor-circuit switches are limited to 500 hp, 600 V.

Horsepower ratings are associated with particular voltages and number of phases. A switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Some enclosed switches have dual horsepower ratings, the larger of which is based on the use of fuses with a time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Switches are marked with their short-circuit current rating(s) in rms symmetrical amps.

Enclosed switches may also be suitable for use as service switches. Such switches are marked “Suitable for Use as Service Equipment.”

Some enclosed switches incorporate neutrals factory bonded to the enclosure. Such switches are marked “Suitable Only for Use as Service Equipment.”

Enclosed switches marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system, or for a second building.

Electrically tripped switches may be provided with ground-fault sensing and relaying equipment.

Switches suitable for use with ground-fault protection but the ground-fault protection sensors or relaying equipment (or both) are located in a separate enclosure are marked “Suitable for Ground Fault Protection When Combined with Class ____ (or Manufacturer and Cat. No.) Ground Fault Sensing Element,” or the equivalent.

Switches intended for use with Class I ground-fault sensing and relaying equipment include those that are capable of interrupting 12 times their rated current or that have integral means to prevent disconnecting at levels of fault current exceeding their contact-interrupting capability.

Switches for use with Class II ground-fault sensing and relaying equipment are capable of interrupting 10 times their rated current and are intended for use in ground-fault protection systems where means to prevent disconnecting at levels of fault current exceeding their contact-interrupting capability are incorporated within the ground-fault sensing and relaying equipment.

RELATED PRODUCTS

Dead-front switches having all current-carrying parts enclosed when mounted in an enclosed panelboard, dead-front switchboard or the like are covered under Switches, Enclosed (WHXS).

Switches that have blade-jaw-type construction where all blade joints are subject to high clamping pressure when the switch is closed by means of a bolt, cam or similar mechanical action (referred to as bolted-pressure contact switches), and switches that have butt-type contacts with a spring-charged mechanism (referred to as high-pressure butt-type contact switches) are covered under Fused Power Circuit Devices (YSR).

Detachable-head pullout switches are covered under Pullout Switches, Detachable Type (WGEU).

Open-type knife switches are covered under Switches, Knife (WIOV).

Enclosed switches intended for use aboard marine vessels are covered under Switches, Enclosed, Marine (WIZZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 98, “Enclosed and Dead-Front Switches.”

UL MARK

Switches, Enclosed (WIAX)—Continued

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Enclosed Switch” or “Enclosed Motor-circuit Switch.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SWITCHES, ENCLOSED FOR USE IN PHOTOVOLTAIC SYSTEMS (WIBC)**GENERAL**

This category covers enclosed switches that are operable without opening the enclosure, intended for use in photovoltaic (PV) systems. These PV switches may be provided with fuseholders for PV fuses and may be electrically tripped. PV switches are suitable for use as disconnects and fusible PV switches are suitable for use as disconnects with overcurrent protection in accordance with Article 690 of ANSI/NFPA 70, “National Electrical Code” (NEC).

Enclosed PV switches are intended for use in ambient temperatures between -20 and 50°C.

Enclosed unfused PV switches are rated for continuous operation at their marked ampere rating.

Enclosed fused PV switches are intended only for use with PV fuses and are rated for continuous load current not to exceed 80% of the maximum ampere rating of the PV fuse marked for use with the device.

PRODUCT MARKINGS

Enclosed PV switches are marked with the maximum electrical ratings, including a voltage rating up to 1000 V dc maximum, current rating, and short-circuit-current rating.

Enclosed PV switches are marked “Photovoltaic” or “PV Disconnect Switch” and may, in addition, be marked “Suitable for Use in Photovoltaic Systems in Accordance with Article 690 of the NEC.”

Multipole enclosed PV switches not intended for individual circuits on each pole are marked with a diagram or other verbiage detailing the correct electrical connections.

Enclosed PV switches are marked for use with copper conductors only, the allowable wire range, and wire type.

Enclosed PV switches are marked “-20 to 50°C.”

Enclosed switches are identified with an Enclosure Type designation as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Enclosed fusible PV switches are marked “This switch is suitable for use in a PV system capable of delivering not more than ____ amperes, when protected by ____ PV fuses [type and manufacturer] rated ____ amperes maximum,” or the equivalent.

Switches that do not isolate the fuseholders are marked as follows, or the equivalent: “WARNING – ELECTRICAL SHOCK HAZARD. THIS SWITCH DOES NOT DE-ENERGIZE BOTH THE LINE AND LOAD SIDE OF THE FUSEHOLDERS WHEN IN THE OPEN POSITION.”

RELATED PRODUCTS

See Switches, Enclosed (WIAX) and Switches, Dead-front for Use in Photovoltaic Systems (WHXX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 98B, “Outline of Investigation for Enclosed and Dead-Front Switches for Use in Photovoltaic Systems.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Enclosed Photovoltaic Switch” (or “Enclosed PV Switch”).

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SWITCHES, KNIFE (WIOV)

USE AND INSTALLATION

This category covers open-type knife switches. Knife switches may be provided with or without fuseholders for plug fuses or for cartridge fuses. Knife switches may have individual bases intended for either front or rear wiring connection or may have switch parts without bases that are intended for mounting on switchboards and panelboards. Knife switches may be single- or multiple-pole, and with or without quick-break or auxiliary contacts, except where such contacts are specifically required.

Knife switches without fuseholders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Knife switches are provided with one of the following means for field connection:

- Terminal pads to which pressure wire connectors can be factory or field installed
- Terminal pads for the connection of busbars
- Wire-binding screws (when intended for the connection of a 10 AWG or smaller wire)

Knife switches without a base and intended for mounting on a panelboard, switchboard, or the like are not required to be provided with a means for field connection.

RATINGS

Standard voltage ratings for knife switches are: 125, 250, 250 dc – 500 ac, 500 ac and 600. For 125, 250 and 600 V, unless otherwise indicated in the marking, the rating includes both alternating and direct currents.

Standard current ratings for knife switches are: 30, 60, 100, 200, 400, 600, 800, 1200, 1600, 2000, 2500, 3000, 4000, 5000 and 6000 A.

Knife switches are not intended for interrupting current of more than 1200 A when the potential rating is 250 V or less, nor are they intended for interrupting current of more than 600 A when the potential rating is more than 250 V. Switches having ratings greater than these limits are marked “For Disconnecting Use Only.” Knife switches that are not intended for interrupting current, but have ratings lower than those limits specified above are marked “For Isolating Use Only.”

Knife switches are marked with a short-circuit current rating in rms symmetrical amperes.

RELATED PRODUCTS

Switches with knife-blade action are also covered under the following:

Switches mounted in an enclosure in which all current-carrying parts are enclosed, and which are operable without opening the enclosure are covered under Switches, Enclosed (WIAX).

Switches that have all current-carrying parts enclosed when mounted in an enclosed panelboard, dead-front switchboard or the like, and that are manually operable by means of external handles without opening the enclosure are covered under Switches, Dead-front (WHXS).

Switches that have blade-jaw-type construction where all blade joints are subject to high clamping pressure when the switch is closed by means of a bolt, cam or similar mechanical action (referred to as a bolted-pressure contact switch) and switches that have butt-type contacts with a spring-charged mechanism (referred to as a high-pressure butt-type contact switch) are covered under Fused Power-circuit Devices (WIOV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 363, “Knife Switches.”

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Knife Switch.”

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SWITCHES, LOAD INTERRUPTER AND ISOLATING, OVER 600 VOLTS (WIQG)

GENERAL

This category covers enclosed medium-voltage load-interrupter and isolating switches having ac voltage ratings from 4.76 kV through 38 kV, with continuous current ratings up to 3000 A. These switches are intended for

Switches, Load Interrupter and Isolating, Over 600 Volts (WIQG)–Continued

installation in accordance with ANSI/NFPA 70, “National Electrical Code.” Load-interrupter switches are rated 200 through 1200 A and may be provided with or without fuses. Switches rated more than 1200 A at any voltage and those rated more than 600 A at 27 kV or greater are isolating only. These switches are available in either stationary or draw-out versions.

These switches are generally three-pole devices; however some switches may be one- or two-pole. Enclosures may be either ventilated or nonventilated.

An enclosure investigated to determine that it is rainproof is marked “Rainproof,” “Outdoor” or “3R.”

Enclosures are marked to indicate the exposure category (A, B or C) for which they are intended. Enclosures marked “Category A” are intended to be installed in areas accessible to the unsupervised general public; enclosures marked “Category B” are intended to be installed in areas accessible to authorized personnel only; enclosures marked “Category C” are intended for use in areas accessible to qualified personnel only.

Unless specifically marked otherwise, these switches are intended for use on three-phase circuits where the nominal voltage to ground is 0.58 times the line-to-line voltage.

Switches may or may not be provided with magnetizing current-interrupting ratings.

Switches may or may not be provided with cable charging ratings.

Load-interrupter switches are marked with a fault close rating. They should not be used on circuits having available fault currents in excess of the fault close rating. When provided with some fuses, it may be necessary for the supply circuit to have an available fault current that is less than the fault close rating of the switch due to the limited interrupting ability of the fuses. Switches are marked as follows on the outside of the enclosure: “SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN ___ RMS SYMMETRICAL AMPS.”

These switches may consist of a single freestanding vertical section or they may consist of several abutting vertical sections intended for interconnection by a horizontal bus. When provided with a horizontal bus, each vertical section is marked with the ampacity of the horizontal bus in amps. Switches that are intended to be part of such a line-up are provided with a “___ of ___” marking, where the second blank indicates the total number of vertical sections provided (including sections not bearing a UL Listing Mark) and the first blank indicates the position (reading from left to right) of the vertical section bearing the marking.

A section, with only horizontal bus or with no installed equipment, may be provided. This section is identified as an enclosure and is numbered as part of a line-up.

ARC-RESISTANT LOAD-INTERRUPTER SWITCHGEAR

Switchgear specially designed to provide some degree of protection to an operator, or other personnel in the vicinity of the equipment, from the effects of an internal arc occurring in atmospheric air within the enclosure when the doors and covers are secured as intended may additionally be Classified as arc-resistant switchgear.

Arc-resistant switchgear may be designed to vent overpressure gases either into the surrounding area or through an exhaust duct outside of the building.

Where overpressure gases are vented in the surrounding areas, the arc-resistant switchgear has been investigated for installation in buildings that have sufficient overhead space and minimum distance from adjacent walls to permit venting without reflecting arc products, as specified in the installation instructions provided by the manufacturer.

When provided with an exhaust duct, overhead space and minimum distance from adjacent walls are not specified. Exhaust ducts provided in the installation are intended to be as specified in the installation instructions provided by the manufacturer.

Arc-resistant switchgear is marked with one of the Accessibility Type designations noted below based upon the construction of the switchgear investigated.

Type 1 designates switchgear with arc-resistant construction at the front only.

Type 1B designates switchgear with arc-resistant construction at the front, and the low-voltage control or instrument compartment(s).

Type 2 designates switchgear with arc-resistant construction at the front, sides and rear.

Type 2B designates switchgear with arc-resistant construction at the front, sides, rear and the low-voltage control or instrument compartment(s).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/NEMA C37.58 (2003), “Indoor AC Medium-Voltage Switches for Use in Metal-Enclosed Switchgear – Conformance Test Procedures,” ANSI/

Switches, Load Interrupter and Isolating, Over 600 Volts (WIQG)—Continued

NEMA C37.57 (2003), "Metal-Enclosed Interrupter Switchgear Assemblies - Conformance Testing," and ANSI/IEEE C37.20.3 (2001), "Metal-Enclosed Interrupter Switchgear."

Metal-enclosed switchgear Classified as "arc resistant" has additionally been investigated to IEEE C37.20.7 (2007), "Guide for Testing Metal-Enclosed Switchgear Rated Up to 38 kV for Internal Arcing Faults."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Isolating Switch," "Metal-Enclosed Interrupter Switchgear," "Metal Enclosed Switchgear," "Load Interrupter Switch" or "Load Interrupter Switchgear."

In an assembly of products the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark covers only the sections included in the assembly.

Classification Mark for Arc-resistant Switchgear

The Classification Mark of UL on metal-enclosed switchgear investigated as arc resistant is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark consists of the Listing Mark noted above and the following additional information:

ARC-RESISTANT SWITCHGEAR

ALSO CLASSIFIED IN ACCORDANCE WITH IEEE C37.20.7

The Classification Mark appears on the front of each vertical section eligible for Classification. The Classification Mark covers only the vertical section to which it is affixed; it does not cover other vertical sections included in the assembly, or removable units. Each vertical section of a line-up of abutting vertical sections is provided with a "____ of ____" marking, where the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark, and the second blank indicates the total number of vertical sections (including sections not bearing the UL Mark).

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SWITCHES, MOLDED CASE (WJAZ)

GENERAL

This category covers fused and unfused molded-case switches.

The maximum voltage rating of a molded-case switch is 600 V.

Unfused switches are tested to determine their acceptability for continuous operation at their marked rated load.

Unfused switches are tested under overload conditions at six times amp rating to cover motor-circuit applications and are suitable for use as motor-circuit disconnects per Section 430.109 of ANSI/NFPA 70, "National Electrical Code."

Fused switches are tested for interrupting capacity at rated voltage and at six times motor full-load running current for alternating-current ratings and at four times motor full-load running current for direct-current ratings.

USE AND INSTALLATION

Unfused two-pole molded-case switches marked to indicate suitability for use on 3-phase circuits have been investigated for controlling 3-phase, corner-grounded delta circuits.

These switches are for use with copper conductors, unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings are independent of any markings on terminal connectors and are readily visible.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60°C wire where wire sizes 14-1 AWG are used, and 75°C wire where wire sizes 1/0 AWG and larger are used.

Molded-case switches without enclosures are intended for use in certified circuit-breaker enclosures, or as a part of other certified equipment or where open-type molded-case switches are acceptable.

Some unfused switches have a release mechanism that causes the switch to open automatically to protect itself in the event of a short-circuit current fault. Such switches are marked to indicate that they may open.

Some enclosed molded-case switches may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected will be identified by a marking, such as on a wiring diagram.

Certified molded-case switches may be mounted in any position.

Switches, Molded Case (WJAZ)—Continued

Line-and-load markings on a molded-case switch are intended to limit connections to those as marked.

Molded-case switches may be equipped with factory-installed accessories, such as alarm and auxiliary switches, remotely energized electrically operated trip mechanisms, and electrical operators.

PRODUCT MARKINGS

No overcurrent protection is provided by the unfused switches and they are marked with a short-circuit current withstand rating.

The fused switches have one or more replaceable fuses to provide overcurrent protection and they are marked with a short-circuit current interrupting rating.

Fused switches are marked "Continuous load current not to exceed 80 percent of the rating of fuses employed."

Some enclosed molded-case switches are marked as suitable for use as service equipment.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Molded Case Switch" (or "M.C.S.") or "Fused Molded Case Switch" (or "Fused M.C.S.>").

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SWITCHES, MOLDED CASE, FOR USE IN PHOTOVOLTAIC SYSTEMS (WJBE)

GENERAL

This category covers fused and unfused molded-case switches for use in dc photovoltaic (PV) systems. Unfused PV switches are suitable for use as disconnects and fusible PV switches are suitable for use as disconnects with overcurrent protection in accordance with Article 690 of ANSI/NFPA 70, "National Electrical Code." These switches are intended for use with certified enclosures or as part of other certified equipment.

PV molded-case switches are rated up to 1000 V dc maximum and are rated for continuous-load operation at their marked ampere rating.

PV molded-case switches are intended for use in ambient temperatures between -20 and 50°C.

A multi-pole PV molded-case switch is intended for individual circuits on each pole unless marked otherwise.

A PV molded-case switch may be mounted in a certified circuit-breaker enclosure or as a part of other certified equipment. The enclosure or equipment may be identified with an enclosure-type designation. The enclosure-type designations are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

A PV molded-case switch may be mounted in any position unless marked to indicate otherwise. If, however, the switch is mounted so that the handle is operated vertically rather than rotationally or horizontally, the up position of the handle should be in the "on" position.

The short-circuit rating on a molded-case switch included in a piece of equipment does not automatically qualify the equipment in which the molded-case switch is installed for use on circuits with higher available currents than the rating of the equipment itself.

PRODUCT MARKINGS

PV molded-case switches are marked with the maximum intended electrical ratings, including a voltage rating up to 1000 V dc maximum, current rating, and short-circuit current rating.

PV molded-case switches are marked "Photovoltaic" (or "PV") and fused PV switches may, in addition, be marked "Suitable for Use in Photovoltaic Systems in Accordance with Article 690 of the NEC," or equivalent.

A multi-pole PV molded-case switch is intended for individual circuits on each pole unless specifically marked with a diagram or other verbiage detailing the correct electrical connections.

PV molded-case switches are marked for use with copper conductors only, the allowable wire range, wire type and stranding if different from building wire.

Switches, Molded Case, for Use in Photovoltaic Systems (WJBE)—Continued

If pressure-terminal connectors are not provided on a molded-case switch as shipped, the molded-case switch is marked stating which pressure-terminal connectors or component terminal kits are acceptable for use with the molded-case switch.

A PV molded-case switch intended only for use within a ventilated enclosure is marked with the specific certified enclosure for which it is intended, or the size of the enclosure and the location and size of the ventilation openings.

Some molded-case switches have a release mechanism that causes the switch to open automatically to protect itself in the event of a short-circuit current fault. Such switches are marked to indicate that they may open.

A PV molded-case switch may be identified with a circuit-breaker enclosure marked with an enclosure-type designation. See Electrical Equipment for Use in Ordinary Locations (AALZ).

A molded-case switch that includes an accessory device, whether attached to the switch by the manufacturer of the molded-case switch or by others, is marked to indicate the presence of that accessory.

Where the accessory is a shunt trip device that is suitable for operation with ground-fault sensing and relaying equipment, such suitability is indicated in the marking of the molded-case switch.

PV molded-case switches are marked "50°C."

ADDITIONAL INFORMATION

For additional information, see Molded-case Switches (WJAZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 489B, "Outline of Investigation for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures for Use with Photovoltaic (PV) Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photovoltaic Molded-case Switch" or "Enclosed Photovoltaic Molded-case Switch." The words "Molded-case Switch" may be abbreviated "M.C.S." and the word "Photovoltaic" may be abbreviated "PV."

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SWITCHES, PHOTOELECTRIC (WJCT)

GENERAL

This category covers photoelectric switches and motion detectors (light-sensitive or presence-sensitive types) intended for use in nonindustrial locations, rated maximum 300 V, 2000 VA, and protected by branch-circuit protection not to exceed 20 A.

Switches investigated for the control of tungsten-filament-lamp loads are marked "Tungsten." Switches investigated for the control of the applicable ballast loads (such as fluorescent) are marked "Magnetic Ballast" or "Electronic Ballast."

The investigation of devices identified as "Raintight" or "Rainproof" includes a test designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water. Devices marked "Raintight" or "Rainproof" are also suitable for wet locations. Devices marked "Indoor Use Only" are suitable for indoor dry locations only.

These switches have been tested to determine their acceptability for continuous operation at their marked load rating.

RELATED PRODUCTS

Photoelectric switches and motion detectors designed to provide protection for mercantile premises, stock rooms, safes, vaults, etc., are covered under Intrusion-detection Units (ANSR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 773A, "Nonindustrial Photoelectric Switches for Lighting Control."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illus-

Switches, Photoelectric (WJCT)—Continued

trated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photoelectric Switch" or "Motion Detector Switch."

The Listing Mark for this category requires the use of a holographic label.

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Photocontrols, Plug-in, Locking Type (WJFX)

USE

This category covers plug-in, locking-type photocontrols for use on outdoor-type electric lighting fixtures used for both street lighting and area lighting (lighting of parking lots and similar applications).

Unless marked specifically "Tungsten" or "Ballast," these products are suitable for use with either type of fixture, rated not more than the rating of the photocontrol. The voltage rating is 480 V ac maximum.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 773, "Plug-In Locking Type Photocontrols for Use with Area Lighting."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photocontroller," "Photocontroller Shorting Plug" or "Photocontroller Open Circuit Plug."

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SNAP SWITCHES (WJQR)

GENERAL

This category covers general-use snap switches, which are so constructed that they can be installed in flush device boxes or on outlet box covers or otherwise used in connection with wiring systems recognized by ANSI/NFPA 70, "National Electrical Code" (NEC).

Door switches are investigated for use only in combination with a specific switch, special switch box and cover. See Switches, Door (WLFV).

Flush snap switches investigated for use without separate outlet boxes with nonmetallic-sheathed cable, Types NM, NMC, NM-B and NMC-B cable in accordance with the NEC, are so identified by a specific marking on the carton in which they are packed.

Snap switches have not been investigated for switching a load between two alternate sources of supply. Double-throw enclosed switches (see Switches, Enclosed [WJAX]) or switches Listed as transfer switches (see Transfer Switches [WPTZ] and Emergency Lighting and Power Equipment [FTBR]) should be used for this purpose.

Multi-pole, general-use snap switches have not been investigated for more than single-circuit operation unless marked "2-circuit" or "3-circuit."

Snap switches without a grounding connection are intended for replacement use only in accordance with NEC 404.9, Exception to (B).

General-use snap switches are classified into two categories: AC-DC general use and AC general use. AC general-use switches are marked "AC" to limit their use to alternating-current circuits. AC-DC general-use switches are not so limited; no such marking is required or generally provided.

AC-DC GENERAL-USE SNAP SWITCHES

The standard amp and voltage ratings for an AC-DC general-use snap switch for controlling direct- or alternating-current circuits are given in Table I. While many of these snap switches will operate successfully on circuits that have some reactance, in general, an inductive load should not exceed one-half the amp rating of the switch at the voltage involved. However, some of these snap switches are marked with additional horsepower ratings at one or more voltages, which indicate that a switch so marked has been tested for the control of a motor of the horsepower and voltage rating indicated. Such a snap switch has been tested for the control of tungsten-filament lamp loads and is marked with the letter "T" as part of the suitable tungsten-filament lamp load rating at 125 V.

Table I

SWITCHES (WFXV)

Snap Switches (WJQR)—Continued

Snap Switch Ratings in Amperes Corresponding to Direct-Current Potentials

125 V	250 V	600 V	125 V	250 V	600 V
—	—	1	—	10	—
3*	1*	—	20	10	—
—	—	2	—	20	10
5*	2*	—	—	—	20
—	—	3	—	20	—
5 or 6	3	—	30**	20	—
—	5	3	40	20	—
—	—	5	—	30	20
—	5	—	—	—	30
10	5	—	—	30	—
—	10	5	60	30	—
—	—	10	—	60	—

Note: The above ratings apply equally when these switches are used on alternating-current circuits

* These dual ratings may be assigned only to a three-way, four-way, two-circuit, three-circuit, or a fixture switch

** A panelboard switch may be rated at 30 A, 125 V, without the corresponding 250 V rating

AC GENERAL-USE SNAP SWITCHES

An AC general-use snap switch has a marked current and voltage rating only for alternating current, which is one of the ratings given in Table II, and is intended for installation in a flush device box (flush snap switch), mounting on an outlet box cover, or surface mounting (surface snap switch).

AC general-use snap switches are tested for the control of resistive, inductive (including electric discharge lamp) and tungsten-filament lamp loads at 120 V up to the full current rating of the switch, and for motor loads up to 80% of the amp rating of the switch, but not exceeding 2 hp.

Table II

AC Snap Switch Ratings in Amperes Corresponding to Alternating-Current Potentials

120 V AC	120 - 277 V AC	277 V AC
15	—	—
20	—	—
30	—	—
—	15	—
—	20	—
—	30	—
20	—	15
30	—	15
30	—	20

Snap switches rated 240 or 250 V that are intended for use on circuits involving a nominal potential to ground of 120 or 125 V, respectively, are tested on such circuits and are marked with the voltage rating "240" or "250" (no underlining). Snap switches rated 240 or 250 V that are suitable for use at full potential to ground are marked with the voltage rating 240 or 250 (double underlining). Snap switches having voltage ratings other than 240 or 250 V are tested on circuits involving full rated potential to ground.

Terminals of 15 A and 20 A switches not marked "CO/ALR" are intended for use with copper and copper-clad aluminum conductors only. Terminals marked "CO/ALR" are for use with aluminum, copper and copper-clad aluminum conductors.

Terminals of the wire-binding screw, setscrew, or screw-actuated back-wired clamping types are suitable for use with solid building wires unless otherwise indicated either on the device or in the installation instructions.

Terminals of a flush snap switch are permitted for use with Listed field-installed crimped-on wire connectors or an assembly, if so identified by the manufacturer.

A flush snap switch may also be provided with conductor leads with factory-installed crimped-on connectors. Such connectors may be either attached to the flush snap switch terminal or are provided with the flush snap switch in the smallest unit shipping container and are suitable for use with the terminal of the flush snap switch.

Screwless terminal connectors of the conductor push-in type (also known as "push-in terminals") are restricted to 15 A branch circuits and are intended for connection with 14 AWG solid copper wire only. They are not intended for use with aluminum or copper-clad aluminum wire, 14 AWG stranded copper wire, or 12 AWG solid or stranded copper wire.

Terminals of switches rated 30 A and above not marked "AL-CU" are intended for use with copper conductors only. Terminals of switches rated 30 A and above marked "AL-CU" are for use with aluminum, copper and copper-clad aluminum conductors.

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SWITCHES (WFXV)

Snap Switches (WJQR)—Continued

turer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Switches, Door (WLFV)

USE

This category covers snap switches intended for use in door jambs.

This category covers an assembly consisting of a switch, special switch box and cover. The special switch box is not an outlet box. It is only intended to terminate the switch leads. It is not intended for any other type of field wiring.

PRODUCT MARKINGS

Certified door switches are marked with the Listee's name or trademark and electrical rating in a location where readily visible after installation. An ac-only door switch, if rated in wattage, is marked "For use with incandescent lighting only" where visible after installation.

The catalog designation is marked on the assembly, on the package, or on a stuffer sheet packaged with each assembly.

ADDITIONAL INFORMATION

For additional information, see Snap Switches (WJQR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 20, "General-Use Snap Switches."

UL MARK

The Listing Mark of UL on the assembly, or the UL symbol stamped or molded into the assembly and the Listing Mark on the smallest unit packaging is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Switch."

In lieu of the UL symbol stamped or molded into the assembly, "UNDERWRITERS LABORATORIES INC. LISTED" (or "UND. LAB. INC. LIST.") may be stamped or molded into the assembly. When marked as such, the Listing Mark shall appear on the smallest unit packaging.

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Switches, Fixture, Socket and Special Mechanism Types (WMHR)

USE

This category covers fixture, socket and special-mechanism-type switches intended for use in appliances, electric fixtures and portable lamps.

PRODUCT MARKINGS

The devices are marked as follows:

- a. Listee's name or identification on device.
- b. Catalog number or equivalent on device or carton.
- c. Complete electrical rating on device.
- d. Switches intended for control of tungsten filament lamps on both direct and alternating current are marked with the letter "T," located to indicate that it applies only to the rating at 125 V. AC/DC switches intended for the control of electric discharge lamps are marked with the letter "F." A switch may be marked with both letters to indicate both uses.
- e. Switches intended for appliance use are marked "FOR APPLIANCE USE."

ADDITIONAL INFORMATION

For additional information, see Snap Switches (WJQR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 20, "General-Use Snap Switches."

UL MARK

The Listing Mark of UL on the product, or the UL symbol stamped or molded into the product and the Listing Mark on the smallest unit packaging is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Switch," "Fixture Snap Switch" or "Fixture Switch."

In lieu of the UL symbol stamped or molded into the product, "UNDERWRITERS LABORATORIES INC. LISTED" (or "UND. LAB. INC. LIST.") may be stamped or molded into the product. When marked as such, the Listing Mark shall appear on the smallest unit packaging.

PRODUCT CATEGORIES BY CATEGORY CODE

Switches, Fixture, Socket and Special Mechanism Types (WMHR)–Continued

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Switches, Flush (WMUZ)

USE

This category covers snap switches intended for mounting in flush device boxes, and also switches investigated for use without separate outlet boxes with Types NM and NMC cable.

ADDITIONAL INFORMATION

For additional information, see Snap Switches (WJQR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 20, "General-Use Snap Switches."

UL MARK

The Listing Mark of UL on the product, or the UL symbol stamped or molded into the product and the Listing Mark on the smallest unit packaging is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Switch."

In lieu of the UL symbol stamped or molded into the product, "UNDERWRITERS LABORATORIES INC. LISTED" (or "UND. LAB. INC. LIST.") may be stamped or molded into the product. When marked as such, the Listing Mark shall appear on the smallest unit packaging.

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Switches, Pendant (WNIX)

GENERAL

This category covers pendant switches, through-cord switches, and combination pendant switches with attachment-plug receptacles.

ADDITIONAL INFORMATION

For additional information, see Snap Switches (WJQR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 20, "General-Use Snap Switches."

UL MARK

The Listing Mark of UL on the product, or the UL symbol stamped or molded into the product and the Listing Mark on the smallest unit packaging is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Switch."

In lieu of the UL symbol stamped or molded into the product, "UNDERWRITERS LABORATORIES INC. LISTED" (or "UND. LAB. INC. LIST.") may be stamped or molded into the product. When marked as such, the Listing Mark shall appear on the smallest unit packaging.

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Switches, Surface (WOKT)

GENERAL

This category covers snap switches intended for surface mounting, unless otherwise stated in the individual certifications.

ADDITIONAL INFORMATION

For additional information, see Snap Switches (WJQR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 20, "General-Use Snap Switches."

Switches, Surface (WOKT)–Continued

UL MARK

The Listing Mark of UL on the product, or the UL symbol stamped or molded into the product and the Listing Mark on the smallest unit packaging is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Switch."

In lieu of the UL symbol stamped or molded into the product, "UNDERWRITERS LABORATORIES INC. LISTED" (or "UND. LAB. INC. LIST.") may be stamped or molded into the product. When marked as such, the Listing Mark shall appear on the smallest unit packaging.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFER SWITCHES (WPTZ)

GENERAL

This category covers automatic and nonautomatic transfer switches, including associated control devices, with maximum ratings of 600 V ac and transfer equipment rated more than 600 V ac but not more than 38 kV.

Transfer switches rated for total system transfer are marked "Suitable for control of motors, electric discharge lamps, tungsten filament lamps, and electric heating equipment where the sum of motor full-load ampere ratings and the ampere ratings of other loads do not exceed the ampere rating of the switch and the tungsten load does not exceed ___ percent of the switch rating."

Transfer switches have been investigated for load switching and inrush capability and for a number of cycles of operation based on their intended use which, in the case of an automatic transfer switch, is expected to include scheduled test operations switching full load.

Automatic transfer switches are required to be designed so that the load cannot remain simultaneously disconnected from both the normal and alternate sources when either or both sources are available, except that transfer switches marked "SUITABLE FOR USE AS SERVICE EQUIPMENT" are provided with externally accessible means to independently disconnect each source intended to be a service.

Automatic transfer switches transfer a common load from a normal supply to an alternate supply in the event of failure of the normal supply, and automatically return the load to the normal supply when the normal supply is reestablished.

Additional sensing devices that may initiate or delay transfer have been investigated in accordance with the manufacturer's marked operating values.

Automatic transfer switches may have a switching contact to initiate the starting of an engine generator set.

Some transfer switches may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected are identified by a marking, such as on a wiring diagram.

Transfer switches are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is indicated on a wiring diagram or other readily visible location.

TRANSFER SWITCHES RATED 600 V OR LESS

Listed transfer switches without enclosures are intended for use as part of other equipment or where open-type devices are acceptable. These devices have the Listing Mark applied to the transfer switch panel. Markings or instructions are provided for open transfer switches to indicate the minimum size enclosure into which the open transfer switch should be installed.

When the Listing Mark is applied to the enclosure of an enclosed transfer switch or bypass switch, it indicates the Listing of the complete enclosed assembly.

Transfer switches intended for use as service equipment are marked "SUITABLE FOR USE AS SERVICE EQUIPMENT."

Transfer switches intended to be connected as service equipment for the normal source only may be provided with a disconnect for the normal source only, in which case the transfer switch is marked "Suitable for use as service equipment – NORMAL source only. An additional disconnect must be readily available for the alternate source, unless the alternate source is an accessible generator and can be readily shut down."

Transfer switches are not intended for connection to a supply capable of delivering currents in excess of the maximum available rms symmetrical amperes (short-circuit current) marked on the transfer switch.

Transfer switches having manual operators accessible only by opening the enclosure are not intended for manual operation under load.

Transfer Switches (WPTZ)—Continued

Unless the device is marked otherwise, the wiring space and terminations are based on 60°C wire for switches rated 100 A or less, and 75°C for switches rated more than 100 A.

Overcurrent/Short-circuit Protection

Transfer switches without integral overcurrent protective devices are suitable for continuous use at 100% of rated current. Transfer switches incorporating integral overcurrent devices are suitable for continuous use at 100% of rated current unless restricted to use at 80% of rated current, as indicated by the marking "CONTINUOUS LOAD CURRENT NOT TO EXCEED 80 PERCENT OF SWITCH RATING" on the switch.

Transfer switches provided with integral overcurrent protection are marked "This transfer switch is rated for use on a circuit capable of delivering not more than ___ rms symmetrical amperes, ___ volts maximum," where the blanks are filled with the available short-circuit current and voltage for which the switch was tested.

Transfer switches not provided with integral overcurrent protection are marked in accordance with a), b) or c) below.

- a) "When protected by ___ ampere maximum Class ___ fuse or Type ___ circuit breaker rated no more than ___ amperes, this transfer switch is rated for use on a circuit capable of delivering not more than ___ rms symmetrical amperes, ___ volts maximum." The first two blanks in this marking are filled with the maximum ampere rating and Class of fuse to be used. The third blank is filled with the specific circuit breaker to be used, including the manufacturer and type designation of the circuit breaker. The fourth blank is filled with the maximum current rating of the circuit breaker. Transfer switches may be marked with only the fuse information or the circuit breaker information, when investigated for use only with fuses or circuit breakers, respectively.
- b) "When protected by a circuit breaker rated no more than ___ amperes, this transfer switch is rated for use on a circuit capable of delivering not more than 10 kA rms symmetrical amperes, ___ volts maximum." The first blank is filled with the maximum current rating of circuit breaker, and the second blank is filled with the maximum circuit voltage. Transfer switches that bear this marking are intended only for use with a molded-case circuit breaker as the overcurrent protection, and may not be rated more than 400 A.
- c) "When protected by a circuit breaker without an adjustable short-time response only or by fuses, this transfer switch is rated for use on a circuit capable of delivering no more than ___ rms symmetrical amperes, ___ volts maximum."

Transfer switches may be marked with an optional short-time current rating. Short-time current is the maximum amount of fault current a switch has been shown to withstand at a specified voltage for a given amount of time and remain functional (including the ability to carry full rated current).

TRANSFER EQUIPMENT RATED OVER 600 V

Transfer equipment rated over 600 V is investigated only as a completely enclosed assembly.

Transfer equipment rated over 600 V is suitable for use on circuits having available fault currents not exceeding the rating marked on the equipment.

Transfer switches rated over 600 V intended for use as service equipment may be marked "SUITABLE FOR USE AS SERVICE EQUIPMENT."

Unless transfer equipment rated over 600 V is marked otherwise, the wiring space and terminations are based on the use of Type MV90 conductors. The ampacity of Type MV90 conductors is specified in Tables 310.75 and 310.76 of ANSI/NFPA 70, "National Electrical Code."

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Accessories, Transfer Switch (WPVQ)

GENERAL

This category covers accessories intended for use with transfer switches rated 600 V or less, including bypass/isolation switches, status indicator panels, enclosed power inlets, and other accessories intended solely for use with certified transfer switches. These accessories are intended for use in conjunction with transfer switches, but are not intended to modify the function or construction of the transfer switch itself.

Bypass switches permit testing and maintenance of emergency system components that could not be otherwise maintained without disruption of important functions. The bypass switching sequence is manually initiated.

A transfer and bypass/isolation switch for use in emergency systems consists of a transfer switch suitable for emergency systems, and with the transfer switch isolated or disconnected the bypass/isolation switch func-

Accessories, Transfer Switch (WPVQ)—Continued

tions as an independent nonautomatic transfer switch and allows the load to be connected to either power source.

Enclosed power inlets are intended for use in standby systems to facilitate cord connection of portable generators for use during temporary outages of utility power. Inlets are intended to be remotely mounted from the transfer switch and connected to the "alternate source" terminals of the transfer switch, such that the blades or pins of the inlet are energized only through the use of a cord connection to a portable generator. Inlets are fully enclosed, such that there are no accessible energized parts with the cord connector in place. Inlets are not intended for use indoors, but may be intended for use in protected areas, such as covered porches or detached garages. Inlets intended for use where exposed to weather are marked Type 3, 3R, 3S, 4, 4X, 6 or 6P, and have been determined to be suitable for outdoor use.

ADDITIONAL INFORMATION

For additional information, see Transfer Switches (WPTZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1008, "Transfer Switch Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Transfer Switch Accessory," "Transfer and Bypass/Isolation Switch," "Bypass/Isolation Switch," "Bypass/Transfer Switch," "Transfer and Bypass/Isolation Switch for Emergency Systems" or "Enclosed Power Inlet."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Automatic Transfer Switches for Use in Emergency Systems (WPWR)

USE

This category covers automatic transfer switches, rated 600 V or less, intended for use in emergency systems in accordance with Articles 517 and 700 of ANSI/NFPA 70, "National Electrical Code" (NEC). These transfer switches are also suitable for use in legally required standby systems and in optional standby systems in accordance with Articles 701 and 702, respectively, of the NEC.

ADDITIONAL INFORMATION

For additional information, see Transfer Switches (WPTZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1008, "Transfer Switch Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Automatic Transfer Switch for Emergency Systems."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Automatic Transfer Switches for Use in Optional Standby Systems (WPXT)

USE

This category covers automatic transfer switches with a maximum rating of 600 V ac, intended for use in optional standby systems in accordance with Article 702 of ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Transfer Switches (WPTZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1008, "Transfer Switch Equipment."

Automatic Transfer Switches for Use in Optional Standby Systems (WPXT)—Continued**UL MARK**

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Automatic Transfer Switch for Use in Optional Standby Systems."

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Meter-mounted Transfer Switches (WPXW)**USE**

This category covers transfer switches rated 600 V or less, intended for mounting in a meter base, on the line side of the service disconnect switch. These transfer switches are intended to transfer the loads connected to the load side of the meter from the normal utility supply to an alternate supply, consisting of a portable generator that is temporarily cord connected to the meter-mounted transfer switch. These devices are not intended for use in emergency systems or in legally required standby systems.

The installation of these devices is intended to be under the exclusive control of the serving utility, and is not considered under the purview of ANSI/NFPA 70, "National Electrical Code." As such, these devices are not considered service equipment.

ADDITIONAL INFORMATION

For additional information, see Transfer Switches (WPTZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1008M, "Outline of Investigation for Transfer Switch Equipment, Meter Mounted."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Meter-mounted Transfer Switch."

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Automatic Transfer Switches Over 600 Volts (WPYC)**USE**

This category covers automatic transfer switches intended for use in systems rated more than 600 V ac. An automatic transfer switch automatically transfers a load to another source of power when the original source fails and will automatically retransfer the load to the original source under desired conditions.

SWITCH TYPES

These switches may be of the fixed preferential, nonpreferential or selective-preferential type.

A fixed-preferential type switch automatically transfers to the original source when it is available.

A nonpreferential type switch retransfers the load to the original source only when the second or emergency source fails.

A selective-preferential type switch is a type in which either source may be selected as the preferred source and which will retransfer the load to the preferred source upon its reenergization.

CONSTRUCTION

The basic switching devices in this equipment may be circuit breakers, load interrupter switches or contactors. The number of expected operations under load is dependent on the type and of switching device used, and the continuous current rating thereof.

The equipment covered under this category is completely enclosed. The equipment may be metal-enclosed, metal-clad or other construction.

An enclosure investigated to determine that it is rainproof is marked "Rainproof," "Outdoor" or "3R." Enclosures may be either nonventilated or ventilated.

This equipment is intended to be installed in areas accessible to qualified personnel only ("Category C") unless the enclosures are marked "Category

Automatic Transfer Switches Over 600 Volts (WPYC)—Continued

A" or "Category B." Enclosures marked "Category A" are intended to be installed in areas accessible to the unsupervised general public; enclosures marked "Category B" are intended to be installed in areas accessible to authorized personnel only; enclosures marked "Category C" are intended to be installed in areas accessible to qualified personnel only. The environmental and exposure category marking need only appear on the first vertical section of a line-up.

RATINGS

These switches are rated over 600 V, up to 38 kV. Assemblies are marked with the following ratings: maximum voltage, frequency, insulating level, continuous current, short-time current and momentary current. This marking appears on each vertical section bearing the UL Mark.

ADDITIONAL INFORMATION

For additional information, see Transfer Switches (WPTZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1008A, "Outline of Investigation for Transfer Switch Equipment, Over 600 Volts."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Automatic Transfer Switch."

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Nonautomatic Transfer Switches (WPYV)**USE**

This category covers nonautomatic transfer switches, rated 600 V or less, intended to transfer a common load from a normal supply to an alternate supply of an equipment system in accordance with Sections 517.34 and 517.43 of ANSI/NFPA 70, "National Electrical Code" (NEC), or to an optional standby system in accordance with Article 702 of the NEC.

ADDITIONAL INFORMATION

For additional information, see Transfer Switches (WPTZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1008, "Transfer Switch Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Non-Automatic Transfer Switch."

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SWITCHES FOR USE IN HAZARDOUS LOCATIONS (WQNV)

Switches rated in horsepower have been tested with respect to interruption of the maximum operating overload current of motors of the same horsepower and voltage ratings. When rated in amps and volts only the switches have not been investigated with respect to use in motor circuits.

SWITCHES, CLOCK OPERATED FOR USE IN HAZARDOUS LOCATIONS (WRBT)**GENERAL**

This category covers clock-operated switches certified with horsepower ratings tested at rated voltage and at six times motor full-load running current for ac ratings, and at ten times motor full-load running current for dc ratings.

SWITCHES FOR USE IN HAZARDOUS LOCATIONS (WQNV)

Switches, Clock Operated for Use in Hazardous Locations (WRBT)—Continued

Clock-operated switches certified with pilot-duty ratings are intended for control of electromagnetic loads, such as a solenoid of a motor controller or electrically operated valve, and are tested with an appropriate electromagnetic load.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Clock Operated Switch for Use in Hazardous Locations," or other appropriate product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ENCLOSED SWITCHES FOR USE IN HAZARDOUS LOCATIONS (WRPR)

GENERAL

This category covers enclosed switches, with or without fuseholders, intended for plug or cartridge fuses. Enclosed switch ratings are limited to 3600 A, 500 hp, 600 V.

Enclosed switches with horsepower ratings in addition to amp ratings are suitable for use in motor circuits as well as for general use. Enclosed switches with amp ratings are intended for general use.

Enclosed switches are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60°C wire in circuits rated 100 A or less, and the use of 75°C wire for higher-amp-rated circuits.

Enclosed motor-circuit switches and enclosed switches with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full-load running current for alternating-current ratings, and at four times motor full-load running current for direct-current ratings.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 98, "Enclosed and Dead-Front Switches."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Enclosed Switch for Hazardous Locations."

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SNAP SWITCHES FOR USE IN HAZARDOUS LOCATIONS (WSQX)

GENERAL

This category covers snap switches that are limited to 30 A, 600 V, ac; 60 A, 250 V, ac or dc; and not more than 2 hp at 600 V or less, ac, 250 V or less, dc.

SWITCHES FOR USE IN HAZARDOUS LOCATIONS (WQNV) 441

Snap Switches for Use in Hazardous Locations (WSQX)—Continued

Snap switches with horsepower ratings have been tested with respect to interruption of maximum overload currents of motors of the same horsepower and voltage ratings.

Snap switches having a "T" rating are capable of controlling tungsten-filament-lamp loads corresponding to the 125 V rating of the switches.

Snap switches provided with a factory seal of conductors entering the switch enclosure are so identified by a marking on the product.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Snap Switch for Use in Hazardous Locations."

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SWITCHES, MISCELLANEOUS FOR USE IN HAZARDOUS LOCATIONS (WTEV)

GENERAL

This category covers various types of switches, such as bin-level indicators, flow switches, limit switches, vibration switches, and the like. The switches in this category are not fused. The suitability of these switches for use on high-capacity circuits has not been investigated.

Switches with amp ratings are intended for general use. Switches with horsepower ratings are suitable for use in motor circuits.

Switches certified with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full-load running current for ac ratings and at four times motor full-load running current for dc ratings.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flow Switch for Use in Hazardous Locations" or "Limit Switch for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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SWITCHES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (WTSN)

Switches rated in horsepower have been tested with respect to interruption of the maximum operating overload current of motors of the same horsepower and voltage ratings. When rated in amps and volts only the switches have not been investigated with respect to use in motor circuits.

PRODUCT CATEGORIES BY CATEGORY CODE

SWITCHES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (WTSN)
ENCLOSED SWITCHES FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (WUGF)
GENERAL

This category covers enclosed switches either with or without fuseholders for plug or cartridge fuses. Enclosed switch ratings are limited to 3600 A, 500 hp, 600 V.

Enclosed switches with horsepower ratings in addition to amp ratings are suitable for use in motor circuits as well as for general use. Enclosed switches with amp ratings are intended for general use.

Enclosed switches are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60°C wire in circuits rated 100 A or less, and the use of 75°C wire for higher-amp-rated circuits.

Enclosed motor-circuit switches and enclosed switches with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full-load running current for alternating-current ratings, and at four times motor full-load running current for direct-current ratings.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Enclosed Switch for Hazardous Locations."

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SWITCHGEAR ASSEMBLIES, METAL ENCLOSED, LOW-VOLTAGE-POWER CIRCUIT-BREAKER TYPE (WUTZ)
GENERAL

This category covers metal-enclosed, low-voltage-power, circuit-breaker switchgear rated up to 600 V ac, nominal.

These switchgear assemblies are completely enclosed on all sides and top with sheet metal (except for ventilation openings and inspection windows) and may contain the following: (1) low-voltage-power circuit breakers, either fused or unfused, (2) bare and/or insulated busbars and connections, (3) instrument and control power transformers, (4) instruments, meters and relays, and (5) control wiring and accessory devices.

The low-voltage-power circuit breakers are contained in individual grounded metal compartments and are controlled either remotely or from the front of the enclosure. The circuit breakers may be stationary or of the draw-out type.

These switchgear assemblies may consist of a single vertical section housing one or more individual low-voltage-power circuit-breaker compartments or auxiliary compartments, along with the associated busbar structure, or may consist of several abutting sections interconnected by horizontal buses.

The auxiliary compartments may house such auxiliary equipment as potential transformers, control power transformers, or other miscellaneous devices.

These switchgear assemblies are marked with the following ratings or with a reference to a drawing which is included with the product and marked with the following ratings: (1) rated maximum voltage, (2) rated frequency, (3) rated insulation level, (4) rated continuous current, (5) rated short-time current, and (6) rated short-circuit current.

Low-voltage-power switching devices used in these switchgear assemblies are suitable for continuous use at 100% of their continuous-current rating.

The marking "Suitable for Use as Service Equipment" appears on each switchgear section or assembly optionally intended for use at a service.

A switchgear section marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system.

Generally this switchgear is shipped without wire connectors and the busbar terminations are provided with standard bolt-hole patterns. The suitability

SWITCHGEAR ASSEMBLIES, METAL ENCLOSED, LOW-VOLTAGE-POWER CIRCUIT-BREAKER TYPE (WUTZ)

ity of the wire connectors installed must be determined by Authorities Having Jurisdiction at the time of final inspection.

A switchgear section investigated to determine if it is rainproof is marked "Rainproof."

The individual power circuit-breaker compartments or adapters are intended to accommodate a low-voltage-power circuit breaker and are marked to indicate the type(s) of circuit breaker that may be installed.

Individual auxiliary compartments are intended to house control components such as meters, instrument and/or control power transformers, and the like.

Low-voltage-power circuit-breaker switchgear assemblies are generally provided with shop drawings or the like that include circuit and connection diagrams of the assembly, continuous-current ratings of the main and section buses, details of control and ground-fault protection (if provided) circuits, etc.

ARC-RESISTANT SWITCHGEAR

Metal-enclosed switchgear specially designed to provide some degree of protection to an operator, or other personnel in the vicinity of the equipment, from the effects of an internal arc occurring in atmospheric air within the enclosure when the doors and covers are secured as intended, may additionally be Classified as arc-resistant switchgear.

Arc-resistant switchgear has been investigated for installation in buildings (for indoor applications) that have sufficient overhead space to permit venting without reflecting arc products, as specified in the installation instructions.

Arc-resistant switchgear is marked with an Accessibility Type designation of Type 1 or 2, 1B or 2B, 1C or 2C, or 1D based upon the construction and the standard used for the investigation.

Type 1 denotes that arcing does not cause holes in the freely accessible front of the enclosure.

Type 2 denotes that arcing does not cause holes in the freely accessible front, sides and rear of the enclosure.

Type 1B denotes that arcing does not cause holes in the freely accessible front of the enclosure or in the walls isolating the low-voltage control or instrument compartments.

Type 2B denotes that arcing does not cause holes in the freely accessible front, sides and rear of the enclosure or in the walls isolating the low-voltage control or instrument compartments.

Type 1C denotes that arcing does not cause holes in the freely accessible front of the enclosure or in the walls separating the compartment in which the arc is initiated from all adjacent compartments.

Type 2C denotes that arcing does not cause holes in the freely accessible front of the enclosure or in the walls separating the compartment in which the arc is initiated from all adjacent compartments, except that a fault in the main busbar compartment is allowed to propagate into the main busbar compartment of adjacent vertical sections.

Type 1D denotes that arcing does not cause holes in the freely accessible front and any other surface of the enclosure under investigation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1558, "Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear," and IEEE C37.20.1, "IEEE Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear."

The basic standard used to investigate switchgear Classified as "arc resistant" is IEEE C37.20.7, "IEEE Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal Arcing Faults."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low-Voltage Power Circuit Breaker Switchgear Section," "Low-Voltage Power Circuit Breaker Compartment" or "Low-Voltage Power Circuit Breaker Auxiliary Compartment."

The Listing Mark for low-voltage-power circuit-breaker switchgear sections also includes the marking "___ of ___." The first blank is stamped with a number indicating the position that the section occupies in the series of sections constituting the switchgear assembly. The second blank is stamped with the total number of sections in the switchgear assembly. Only those sections and compartments that bear the Listing Mark are covered under UL's Follow-Up Service.

Classification Mark for Arc-resistant Switchgear

The Classification Mark of UL on switchgear investigated as arc resistant is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark consists of the appropriate Listing Mark (noted above) and the following additional information:

ARC-RESISTANT SWITCHGEAR

ALSO CLASSIFIED IN ACCORDANCE WITH IEEE C37.20.7

SWITCHGEAR ASSEMBLIES, METAL ENCLOSED, LOW-VOLTAGE-POWER CIRCUIT-BREAKER TYPE (WUTZ)

The Classification Mark appears on the front of each vertical section eligible for Classification. The Classification Mark covers only the vertical section to which it is affixed; it does not cover other vertical sections included in the assembly, or the removable circuit breaker. Each vertical section of a line-up of abutting vertical sections is provided with a “_____ of _____” marking, where the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark, and the second blank indicates the total number of vertical sections (including sections not bearing the UL Mark).

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SWITCHGEAR OVER 600 VOLTS (WVDA)

ARC-RESISTANT SWITCHGEAR

Switchgear specially designed to provide some degree of protection to an operator, or other personnel in the vicinity of the equipment, from the effects of an internal arc occurring in atmospheric air within the enclosure when the doors and covers are secured as intended may additionally be classified as arc-resistant switchgear.

Arc-resistant switchgear may be designed to vent overpressure gases either into the surrounding area or through an exhaust duct outside of the building.

Where overpressure gases are vented in the surrounding areas, the arc-resistant switchgear has been investigated for installation in buildings that have sufficient overhead space and minimum distance from adjacent walls to permit venting without reflecting arc products, as specified in the installation instructions provided by the manufacturer.

When provided with an exhaust duct, overhead space and minimum distance from adjacent walls are not specified. Exhaust ducts provided in the installation are intended to be as specified in the installation instructions provided by the manufacturer.

Arc-resistant switchgear is marked with an Accessibility Type designation based upon the construction and the standard to which the switchgear is investigated.

When investigated in accordance with EEMAC G14-1, “EEMAC Procedure for Testing the Resistance of Metal Clad Switchgear Under Conditions of Arcing Due to an Internal Fault,” the Accessibility Types may be A, B or C.

Type A designates switchgear with arc-resistant construction at the front only.

Type B designates switchgear with arc-resistant construction at the front, sides and rear. None of these Type designations imply that the equipment maintains its intended degree of protection when operated with any door or cover, including low-voltage control or instrument compartment doors or covers open.

Type C designates switchgear with arc-resistant construction at the front, sides and rear, and between compartments within the same cell or adjacent cells. In Type C equipment, a fault in a main busbar compartment may propagate into the main busbar compartments of adjacent feeder cells.

When investigated in accordance with IEEE C37.20.7, “IEEE Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal Arcing Faults,” the Accessibility Types may be 1, 1B, 1C, 1D-SR, 1D-SL, 1D-R, 2, 2B or 2C.

Type 1 designates switchgear with arc-resistant construction at the front only.

Type 1B designates switchgear with arc-resistant construction at the front, and the low-voltage control or instrument compartment(s).

Types 1D-SR, 1D-SL, 1D-R designate switchgear with arc-resistant construction in the front; and at the right side (SR), left side (SL) or the rear (R), respectively.

Type 1C designates switchgear with arc-resistant construction at the front, and between compartments within the same cell or adjacent cells. In Type 1C equipment, a fault in a main busbar compartment may propagate into the main busbar compartments of adjacent feeder cells.

Type 2 designates switchgear with arc-resistant construction at the front, sides and rear.

Type 2B designates switchgear with arc-resistant construction at the front, sides, rear and the low-voltage control or instrument compartment(s).

Type 2C designates switchgear with arc-resistant construction at the front, sides and rear, and between compartments within the same cell or adjacent cells. In Type 2C equipment, a fault in a main busbar compartment may propagate into the main busbar compartments of adjacent feeder cells.

SWITCHGEAR OVER 600 VOLTS (WVDA)

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SWITCHGEAR, GAS-INSULATED TYPE, OVER 600 VOLTS (WVEK)

GENERAL

This category covers indoor medium-voltage switchgear where gas, typically sulfur hexafluoride (SF₆), is used as the insulating medium. The term “indoor” does not preclude the use of this equipment in outdoor enclosures, but rather defines the class of equipment. This equipment includes circuit breakers that are specifically intended to provide feeder or branch-circuit overcurrent protection. This equipment is not intended for use as service entrance equipment. These devices are intended for installation in accordance with ANSI/NFPA 70, “National Electrical Code.”

CIRCUIT BREAKERS

The circuit breakers are three-pole devices, fixed, trip-free. Interruption may take place in a gas-filled chamber or in a vacuum interrupter that is in a gas-filled chamber. Each circuit breaker pole may be housed separately.

Each circuit breaker is connected to an isolating/grounding switch that can connect the circuit breaker to the circuit, disconnect the circuit breaker, or ground the load circuit through the circuit breaker.

Circuit Breaker Ratings

Each circuit breaker is provided with a marking that indicates the voltage and current ratings for both the close and trip coils. This marking also contains a “close-and-latch” rating in kiloamperes that is equivalent to the momentary rating (maximum asymmetrical current rating) of the circuit breaker. This rating is expressed in rms asymmetrical amperes. Circuit breakers have a rated maximum voltage of 4.76, 8.25, 15, 27 or 38 kV with continuous current ratings of 1200, 2000 or 3000 A.

Circuit breakers are marked with an interrupting rating “I” in rms symmetrical amperes that is applicable at the maximum rated voltage. Circuit breakers using the rating structure of ANSI/IEEE C37.06 (1987), “AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis Preferred Ratings and Related Required Capabilities,” are also provided with a “K” factor for determining the interrupting rating at a use voltage lower than the maximum rated voltage. The circuit breaker may interrupt a current greater than “I” by a factor up to the value of “K,” at a voltage reduced from the maximum rated voltage, “V max” by the same factor, or at a lower voltage, as depicted in Illustration 1 of Circuit Breakers and Metal-clad Switchgear Over 600 Volts (DLAH). Circuit breakers using the rating structure of ANSI/IEEE C37.06 (1997) or later do not have a “K” factor, or are marked with a “K” factor of 1.0.

Unless specifically marked otherwise, these circuit breakers are intended for use on three-phase circuits where the nominal voltage-to-ground is 0.58 times the line-to-line voltage.

GAS-INSULATED SWITCHGEAR

This switchgear may consist of several gas-filled compartments connected together. Gas-filled compartments are isolated from each other by gas seals. The compartments are electrically connected together and grounded. A compartment may house a circuit breaker, a length of bus, or a switch. A dual bus system, with isolating switches, may be provided.

A vertical section may consist of a circuit breaker, a switch, a bus compartment and a control compartment. A vertical section may be a single freestanding section or they may consist of a number of abutting vertical sections intended for interconnection by a horizontal bus.

Each vertical section of a line-up of abutting vertical sections is provided with a “_____ of _____” marking where the second blank indicates the total number of vertical sections provided (including sections not bearing the UL Listing Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Listing Mark.

Auxiliary equipment such as potential transformers and current transformers are factory installed. Other auxiliary equipment such as protective relays and the like are separately enclosed within the switchgear. They are not typically in gas-insulated compartments.

The output of these current sensors is connected to either protective relays or similar sensing and relaying equipment that is typically panel mounted or located behind a dead front.

Gas-insulated Switchgear Ratings

Switchgear assemblies are marked with the following ratings: maximum voltage, frequency, insulating level, continuous current, short-time current and momentary current. When provided with a horizontal bus, each section is marked with the ampacity of the horizontal bus in amperes. This marking appears on each vertical section bearing the UL Listing Mark.

ARC-RESISTANT SWITCHGEAR

Metal-clad switchgear specially designed to provide some degree of protection to an operator, or other personnel in the vicinity of the equipment, from the effects of an internal arc occurring in atmospheric air within the

Switchgear, Gas-insulated Type, Over 600 Volts (WVEK)—Continued

enclosure when the doors and covers are secured as intended may additionally be Classified as arc-resistant switchgear.

ENCLOSURES

The standard enclosure for the parts operating at medium voltage consists of the metal housing that contains the gas-insulating medium. The enclosures are intended for indoor applications.

An additional enclosure investigated to determine that it is rainproof is marked "Rainproof," "Outdoor" or "3R." These enclosures may be either nonventilated or ventilated. Enclosures intended for outdoor use are marked to indicate the exposure Category (A, B or C) for which they are intended. Enclosures marked "Category A" are intended to be installed in areas accessible to the unsupervised general public; enclosures marked "Category B" are intended to be installed in areas accessible to authorized personnel only; enclosures marked "Category C" are intended to be installed in areas accessible to qualified personnel only. The environmental and exposure category marking need only appear on the first (incoming) switchgear vertical section of a line-up.

ADDITIONAL INFORMATION

For additional information, see Switchgear Over 600 Volts (WVDA) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are IEEE C37.20.2 (1993), "Standard for Metal-Clad Switchgear," ANSI/NEMA C37.54 (2002), "Indoor Alternating Current High-Voltage Circuit Breakers Applied as Removable Elements in Metal-Enclosed Switchgear – Conformance Test Procedures," and ANSI/NEMA C37.55 (2002), "Switchgear – Medium Voltage Metal-Clad Assemblies – Conformance Test Procedures." Circuit breakers investigated prior to 2002 were investigated to ANSI/NEMA C37.54 (1987).

Switchgear Classified as "arc resistant" has additionally been investigated to EEMAC G14-1, "EEMAC Procedure for Testing the Resistance of Metal Clad Switchgear Under Conditions of Arcing Due to an Internal Fault," or IEEE C37.20.7, "IEEE Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal Arcing Faults," as indicated in the Classification Mark.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Gas Insulated Switchgear."

In an assembly of products, the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark on the overall enclosure covers only the vertical section to which it is affixed and any installed fixed circuit breakers; it does not cover other vertical sections included in the assembly or removable circuit breakers.

Classification Mark for Arc-resistant Switchgear

The Classification Mark of UL on switchgear investigated as arc resistant is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark consists of the Listing Mark noted above and the following additional information:

**ARC-RESISTANT SWITCHGEAR
ALSO CLASSIFIED IN ACCORDANCE WITH
[standard designation and date]**

The Classification Mark appears on the front of each vertical section eligible for Classification. The Classification Mark covers only the vertical section to which it is affixed; it does not cover other vertical sections included in the assembly, or the removable circuit breaker. Each vertical section of a line-up of abutting vertical sections is provided with a "____ of ____" marking, where the second blank indicates the total number of vertical sections (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark.

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**SWITCHGEAR, METAL ENCLOSED, OVER
600 VOLTS (WVGN)****GENERAL**

This category covers medium-voltage, metal-enclosed switchgear where air is used as the primary insulating medium. This does not preclude the use of gas within the switching chamber of a switch or circuit breaker used

Switchgear, Metal Enclosed, Over 600 Volts (WVGN)—Continued

in the switchgear. This equipment may include load-break switches, or circuit breakers that are specifically intended to provide feeder or branch-circuit overcurrent protection. This equipment may also include isolating-type switches that are interlocked with circuit breakers or load-break switches. These devices are intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code."

CIRCUIT BREAKERS

Circuit breakers are three-pole, fixed-type devices. Interruption may take place in a vacuum interrupter, in a gas-filled chamber, or in a vacuum interrupter that is in a gas-filled chamber. Each circuit-breaker pole may be housed separately.

Each circuit breaker is connected to an isolating/grounding switch that can connect the circuit breaker to the circuit, disconnect the circuit breaker, or ground the load circuit through the circuit breaker.

Circuit-breaker Ratings

Each circuit breaker is provided with a marking that indicates the voltage and current ratings for both the close and trip coils. This marking also contains a "close-and-latch" rating in kiloamperes that is equivalent to the momentary rating (maximum asymmetrical current rating) of the circuit breaker. This rating is expressed in rms asymmetrical amperes. The preferred maximum voltage ratings for circuit breakers are 4.76, 8.25, 15, 27 or 38 kV with preferred continuous current ratings of 1200, 2000 or 3000 A. Circuit breakers may have ratings other than these preferred ratings.

Circuit breakers are marked with an interrupting rating "I" in rms symmetrical amperes that is applicable at the maximum rated voltage. Unless specifically marked otherwise, these circuit breakers are intended for use on three-phase circuits where the nominal voltage-to-ground is 0.58 times the line-to-line voltage.

SWITCHES

Switches are three-pole, gang-operated-type devices. Interruption may take place in air, or in a gas-filled chamber. The switches provide either a load break or isolating function, and may also provide a means to ground the load conductors. Switches intended for isolation only are interlocked with a device that has been investigated for switching of loads.

Switch Ratings

Each switch is provided with a marking that indicates the switch ratings. This marking includes the rated maximum voltage and continuous current rating of the switch. The preferred maximum voltage ratings for switches are 4.76, 8.25, 15, 27 or 38 kV with preferred continuous current ratings of 200, 600, 1200, 2000 or 3000 A. Switches may have ratings other than these preferred ratings. Switches are also marked with a momentary withstand rating, expressed in rms asymmetrical amperes (kA).

Load-break-type switches are marked with a fault-making rating, expressed in rms asymmetrical amperes, which is applicable at the maximum rated voltage. Unless specifically marked otherwise, these switches are intended for use on three-phase circuits where the nominal voltage-to-ground is 0.58 times the line-to-line voltage.

METAL-ENCLOSED SWITCHGEAR

Vertical sections may consist of a circuit breaker, a switch, a bus compartment and a control compartment. Vertical sections may be single freestanding sections or they may consist of a number of abutting vertical sections intended for interconnection by a horizontal bus.

Each vertical section of a line-up of abutting vertical sections is provided with a "____ of ____" marking, where the second blank indicates the total number of vertical sections provided (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark.

Auxiliary equipment, such as potential transformers and current transformers, are factory installed. Other auxiliary equipment, such as protective relays and the like, are separately enclosed within the switchgear. They are not typically in gas-insulated chambers.

The output of each potential and current transformer is connected to either protective relays or similar sensing and relaying equipment that is typically panel mounted or located behind a dead front.

Metal-enclosed Switchgear Ratings

Switchgear assemblies are marked with the following ratings: maximum voltage, frequency, insulating level, continuous current, short-time current and momentary current. When provided with a horizontal bus, each section is marked with the ampacity of the horizontal bus in amperes. This marking appears on each vertical section bearing the UL Mark.

ARC-RESISTANT SWITCHGEAR

Metal-enclosed switchgear specially designed to provide some degree of protection to an operator, or other personnel in the vicinity of the equipment, from the effects of an internal arc occurring in atmospheric air within the enclosure when the doors and covers are secured as intended may additionally be Classified as arc-resistant switchgear.

ENCLOSURES

The standard enclosure for the parts operating at medium voltage consists of the metal housing that contains the switches, circuit breakers, and auxiliary equipment. The enclosures are intended for indoor applications unless marked otherwise.

SWITCHGEAR OVER 600 VOLTS (WVDA)

Switchgear, Metal Enclosed, Over 600 Volts (WVGN)—Continued

Enclosures are marked to indicate the exposure category (A, B or C) for which they are intended. Enclosures marked "Category A" are intended to be installed in areas accessible to the unsupervised general public; enclosures marked "Category B" are intended to be installed in areas accessible to authorized personnel only; enclosures marked "Category C" are intended to be installed in areas accessible to qualified personnel only.

When intended for outdoor use, an enclosure is investigated to determine that it is rainproof and is marked "Rainproof" or "Outdoor." These enclosures may be either nonventilated or ventilated.

The environmental and exposure category marking need only appear on the first (incoming) switchgear vertical section of a line-up.

ADDITIONAL INFORMATION

For additional information, see Switchgear Over 600 Volts (WVDA) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are:

- ANSI/IEEE 1247 (2005), "IEEE Standard for Interrupter Switches for Alternating Current Rated Above 1000 Volts"
- ANSI/IEEE C37.20.3 (2001), "Metal-Enclosed Interrupter Switchgear"
- ANSI/IEEE C37.20.4 (2001), "Standard for Indoor AC Switches (1 kV – 38 kV) for Use in Metal-Enclosed Switchgear"
- ANSI/NEMA C37.54 (2002), "For Indoor Alternating Current High-Voltage Circuit Breakers Applied as Removable Elements in Metal-Enclosed Switchgear – Conformance Test Procedures"
- ANSI/NEMA C37.57 (2003), "Metal-Enclosed Interrupter Switchgear Assemblies – Conformance Testing"
- ANSI/NEMA C37.58 (2003), "Indoor AC Medium-Voltage Switches for Use in Metal-Enclosed Switchgear – Conformance Test Procedures"

Switchgear Classified as "arc resistant" has additionally been investigated to EEMAC G14-1, "EEMAC Procedure for Testing the Resistance of Metal Clad Switchgear Under Conditions of Arcing Due to an Internal Fault," or IEEE C37.20.7, "IEEE Guide for Testing Medium-Voltage Metal-Enclosed Switchgear for Internal Arcing Faults," as indicated in the Classification Mark.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Metal-enclosed Switchgear, Over 600 V."

In an assembly of products, the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark on the overall enclosure covers only the vertical section to which it is affixed and any installed fixed-mount switches or fixed-mount circuit breakers; it does not cover other vertical sections included in the assembly, or removable switches or circuit breakers.

Classification Mark for Arc-resistant Switchgear

The Classification Mark of UL on switchgear investigated as arc resistant is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark consists of the Listing Mark noted above and the following additional information:

**ARC-RESISTANT SWITCHGEAR
ALSO CLASSIFIED IN ACCORDANCE WITH
[standard designation and date]**

The Classification Mark appears on the front of each vertical section eligible for Classification. The Classification Mark covers only the vertical section to which it is affixed; it does not cover other vertical sections included in the assembly, or the removable circuit breaker. Each vertical section of a line-up of abutting vertical sections is provided with a "____ of ____" marking, where the second blank indicates the total number of vertical sections (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark.

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**SWITCHGEAR, PAD MOUNTED,
SUBSURFACE AND VAULT OVER 600
VOLTS (WVHN)**

GENERAL

SWITCHGEAR OVER 600 VOLTS (WVDA)

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Switchgear, Pad Mounted, Subsurface and Vault Over 600 Volts (WVHN)—Continued

This category covers medium-voltage, pad-mounted, subsurface and vault switchgear having ac voltage ratings up to 38 kV ac maximum. For purposes of this category, pad-mounted, subsurface and vault switchgear may be designated as distribution switchgear (DSG).

Pad-mounted switchgear is an enclosed switchgear assembly in which all energized parts are insulated and completely enclosed within a grounded shield system when separable connectors are in place.

Pad-mounted switchgear is intended for installation in outdoor, above-ground areas accessible to the unsupervised general public in accordance with ANSI/NFPA 70, "National Electrical Code." Although intended for outdoor use, this equipment is not precluded from being used indoors.

Subsurface switchgear is a submersible switching assembly suitable for application in a below-grade enclosure and is normally surface operable. Subsurface switchgear may be provided as open equipment.

Vault switchgear is open type (unenclosed), partially enclosed, or enclosed-type switchgear intended to be installed in an electrical vault, in which the switch and accessories are operable from inside a vault.

Each assembly of DSG includes one or more "ways." A "way" is a three-phase or single-phase circuit connection to the bus, which may contain combinations of switches and protective devices or may be solid bus.

DSG may use oil, air, or another gas (such as SF₆) as the insulating medium for the entire assembly, or for portions of the assembly, such as individual switches.

DSG is intended to be cable connected using separable insulated connector systems complying with IEEE 386, "Separable Insulated Connector Systems for Power Distribution Systems Above 600 V."

ENCLOSURES

The enclosures of pad-mounted switchgear are provided with security features such as pentahead securing bolts and padlocking provisions on all access doors.

Pad-mounted switchgear has not been investigated for installation in coastal environments unless so marked. Coastal environments are those land areas within 2500 ft of the mean high-water line.

Tanks and cabinets of submersible equipment are made of corrosion-resistant materials or provided with impact- and corrosion-resistant finishes. No additional investigation of enclosures for subsurface or vault-type switchgear is included under this category.

SWITCHES

Switches may be single- or three-phase, dead-front or live-front, pad-mounted, subsurface or vault. Switches may be provided with or without protective devices, such as fuses or fault interrupters.

Switch Ratings

Each switch within DSG has the following ratings: continuous current, load-switching current, loop-switching current, cable-charging switching current, and transformer-magnetizing switching current.

The preferred continuous-current ratings of load-interrupter switches within DSG are 200, 400 and 600 A, but switches may be investigated for ratings other than the preferred ratings.

PRODUCT MARKINGS

All DSG is marked with:

- a) Name of the manufacturer and type designation
- b) Model, style number and catalog number (if any)
- c) Unique serial number
- d) Date of manufacture (month and year)
- e) Rated maximum voltage
- f) Rated power frequency
- g) Rated lightning-impulse withstand voltage (BIL)
- h) Rated power-frequency withstand voltage
- i) Rated short-circuit current
- j) Total weight, including insulating medium
- k) Type and quantity of insulating medium
- l) Three-line schematic diagram

The marked rated maximum voltage is no greater than the voltage rating of the lowest rated "way." The equipment is also marked with a description of the type of equipment, for example, "Pad-mounted Fused Switch" or "Fused Load-break Way." The nameplate may be located on the exterior of the equipment or within an interior compartment.

Each "way" is marked with the manufacturer and type designation of switch and manufacturer and type designation of fuse mounting. In addition, a "way" may be marked with maximum voltage and short-circuit current. The maximum voltage and short-circuit current ratings are optional since they are part of the overall marking of the DSG.

Three-phase DSG containing one or more "ways" with components rated for phase-to-ground voltage (maximum voltage divided by 1.732), such as fuses, single-phase switches, or fused load-break devices, is marked with the designation "Grd-Y" (grounded-wye) added to the maximum voltage.

Each "switched way," "fused-switched way," or "fused load-break way" is marked with the following ratings: continuous current, load-switching

Switchgear, Pad Mounted, Subsurface and Vault Over 600 Volts (WVHN)–Continued

current, loop-switching current, cable-charging switching current, and transformer-magnetizing switching current.

Each “fused way” or “tapped way” is marked with the continuous current rating of the “way.”

Each enclosure is marked **DANGER – HIGH VOLTAGE – KEEP OUT.**

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/IEEE C37.74 (2003), “Standard Requirements for Subsurface, Vault, and Pad-Mounted Load-Interrupter Switchgear and Fused Load-Interrupter Switchgear for Alternating Current Systems Up to 38 kV.”

Pad-mounted switchgear is additionally investigated to ANSI/IEEE C57.12.28 (2005), “Pad-Mounted Equipment – Enclosure Integrity.”

Enclosures for pad-mounted switchgear intended for installation in coastal areas are additionally investigated to IEEE C57.12.29 (2005), “Pad-Mounted Equipment – Enclosure Integrity for Coastal Environments.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Pad-mounted Switchgear,” “Subsurface Switchgear” or “Vault Switchgear.”

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TABLES, UTILITY (WWJT)

GENERAL

This category covers tea or coffee tables, lightweight kitchen and utility tables, portable ironing boards, projector tables, and portable cabinets and desks, all with permanently attached receptacles, and with a separable cord set or permanently attached power-supply cord. Except for projector tables that may contain a small lamp for previewing slides, the units contain no electrical load other than optional pilot lights.

RELATED PRODUCTS

Carts intended for use with audio-, video-, or television-type products that have a shelf more than 39.37 in. (1 m) above the floor and that are intended for use in schools, institutions, and the like are covered under Carts, Tall Institutional (CZWK).

Carts, stands, racks, shelves, and the like intended for household or commercial use with audio-, video-, or television-type products such as television carts, audio racks, wall-mounted or ceiling-hung shelves, and television pedestals are covered under Carts and Stands for Household, Commercial and Professional Use (CZUV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 498, “Attachment Plugs and Receptacles,” ANSI/UL 817, “Cord Sets and Power-Supply Cords,” and UL 1363, “Relocatable Power Taps.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Utility Table,” “Projector Table,” “Desk,” “Drafting Table,” “Portable Utility Cabinet,” “Ironing Board With Supply Cord,” or other appropriate product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TANK-MONITORING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (WWQS)

GENERAL

This category covers tank-monitoring equipment, including control units, indicators, sensors, transmitters, liquid-level probes and auxiliary devices used for tank monitoring or as part of tank-monitoring systems.

Certain products in this category are associated apparatus and are intended for installation in unclassified locations. They are provided with intrinsically safe circuits as indicated on the product, for extension into a hazardous (classified) location.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Tank Monitoring Equipment for Use in Hazardous Locations” or “Tank Monitoring Equipment (Associated Apparatus),” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TANK-MONITORING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (WWQZ)

GENERAL

This category covers tank-monitoring equipment, including control units, indicators, sensors, transmitters, liquid-level probes and auxiliary devices used for tank monitoring or as part of tank-monitoring systems.

Certain products in this category are associated apparatus and are intended for installation in unclassified locations. They are provided with intrinsically safe circuit(s) as indicated on the product, for extension into a hazardous (classified) location.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Tank-monitoring Equipment for Use in Hazardous Locations” or “Tank-monitoring Equipment (Associated Apparatus),” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TELECOMMUNICATIONS EQUIPMENT (WYIE)

Listing of the following products appear in this section:
Custom-built Telecommunications Equipment

Telephone Appliances and Equipment
Telephones, Cellular

Telephone power supplies are covered under Power Supplies, Telephone (QQJE). Telecommunications equipment covered under this category has not been investigated for use in computer/information technology rooms as defined in the "Standard for the Protection of Electronic Computer/Data Processing Equipment", NFPA 75. Computers and related equipment, including telecommunications equipment, that interface with electronic data processing systems and are intended for use in computer/information technology rooms are covered under Data Processing Equipment, Electronic (EMRT) or Information Technology Equipment (NWGQ).

Telecommunications equipment identified as suitable for outdoor locations is marked with an enclosure type designation or as "Rain tight" or "Rainproof" and is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ). Telecommunications equipment not marked as suitable for outdoor locations is for indoor use only and the acceptability of such equipment when installed in semi-protected or otherwise shielded locations is determined by the Authority Having Jurisdiction.

Unless marked to indicate special circuit characteristics (such as "Class 2" or "Class 3") or another specific function (such as "keyboard"), telecommunications-type output connectors (such as RJ-series modular jacks, 50-pin commercial connectors, and insulation piercing terminals) of telecommunications equipment are limited to telecommunications-circuit levels and are suitable for connection to typical telecommunications networks and distribution wiring installed in accordance with Article 800 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Certain types of telecommunications equipment are intended to be installed on telecommunications lines protected by a secondary protector and are marked to indicate this fact. Secondary protectors are Listed under Secondary Protectors for Communication Circuits (QVRG).

Certain types of telecommunications equipment are Listed as accessories for use only with other Listed equipment or systems and are identified by the word "Accessory."

Telecommunications equipment and their accessories that are suitable for mounting in air-handling spaces, as covered by Section 300.22(C) of the NEC, are specifically identified by markings on the product and in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

CUSTOM-BUILT TELECOMMUNICATIONS EQUIPMENT (WYKM)

GENERAL

This category covers custom-built, modular telecommunications equipment and accessories that include various combinations of cabinets, racks, circuit card assemblies, power supplies, and the like designed for field installation by trained service personnel. They are intended for installation in accordance with Article 800 of ANSI/NFPA 70, "National Electrical Code" (NEC).

This equipment is intended to be installed and maintained by local exchange carriers (LECs), inter-exchange carriers (IXCs), and similar operating telecommunications companies, which provide service to the subscriber's premise and access to the public network.

INSTALLATION

Custom-built telecommunications equipment is intended to be installed only in restricted access locations, such as equipment rooms or closets, where access is limited to trained service personnel, unless it is installed in a certified rack, cabinet, or similar enclosure identified with the installation code "E."

Some units may have accessible parts (such as the output terminals of a low-power, ring-generator power supply) that operate at Class 3 voltage levels. The location of these units either in the restricted access location or in the final system configuration is intended to be such that unintentional contact with these parts is unlikely.

Unless identified with the installation code "B" or "E," custom-built telecommunications equipment is intended to be installed only over a non-combustible surface or in a certified rack, cabinet, or similar enclosure that is identified with the installation code "B" or "E."

Custom-built telecommunications equipment is intended to be configured in a system and installed in accordance with the manufacturer's installation instructions and the network carrier's installation practices. In order to ensure proper coordination of the individual units in the final installation, letter codes are provided to identify significant input, output, and installation parameters. These are divided into three categories: Power Codes (PC), Telecommunications Codes (TC), and Installation Codes (IC).

Power Codes (PC)

Custom-built Telecommunications Equipment
(WYKM)—Continued

Power codes provide information relating to the type of power required to be supplied to the unit (input) or the type of power supplied by the unit (output).

C — As an input code, this designation requires the power inputs to the unit to be limited to normal telecommunications levels. Acceptable sources of power are certified telephone power supplies identified as having "Level C" outputs, certified custom-built telecommunications equipment with an output code "C," or communications line powering from certified telephone equipment or the public network. As an output code, this designation indicates that the outputs are limited to normal telecommunications levels (Level C) and are suitable for connection to typical telecommunications networks and distribution wiring that are installed in accordance with Article 800 of the NEC.

F — As an input code, this designation requires the power inputs to the unit to be provided with overcurrent protection or be otherwise power limited. Acceptable sources of power are certified telephone power supplies identified as having "Class 2" or "Level C" outputs, a certified Class 2 power source, or certified custom-built telecommunications equipment with an output code of "F" or "C." As an output code, this designation indicates that the unit provides power-limited outputs that are intended to be used for custom-built telecommunications equipment in the same system. These outputs have not been investigated as Class 2 circuits or communications circuits unless identified as such.

L — As an input code, this designation requires that, with overcurrent protection bypassed, the power source supplying the unit be limited to 250 VA and the current source be limited to 1000 V max. Acceptable types of limited power sources are certified Class 2 power supplies, a certified telephone power supply with outputs identified as being source limited, or certified custom-built telecommunications equipment with a power output code "L."

As an output code, this designation indicates that, with overcurrent protection bypassed, the unit provides power outputs that are source limited to 250 VA with the current limited to 1000 V max.

The following table summarizes acceptable power sources for units with input power codes C, F and L.

Power Source	May Supply Unit With An Input Power Code:
Output power code "L"	L
Output power code "F"	F
Output power code "C"	L, F, C
Class 2 power source	L, F
Communications circuits (e.g., public network)	L, F, C
Certified telephone power supplies with identified "Level C" outputs	L, F, C
Certified telephone power supplies with identified "source-limited" outputs	L

Telecommunications Codes (TC)

Telecommunications codes provide information relating to the characteristics of the telecommunications circuits that may be connected to the unit.

T — Provided as an output code, this designation indicates that the equipment provides isolation from "exposed" circuits requiring protection in accordance with Section 800.30 of the NEC.

X — As an input code or as an output code, this designation indicates that the input or output telecommunications circuits are suitable for connection to "exposed" circuits requiring protection in accordance with Section 800.30 of the NEC. Absence of this code is an indication that the equipment is intended to be isolated from "exposed" circuits by equipment with an output code designation "T."

Installation Codes (IC)

Installation codes provide information relating to the location and/or installation of the unit.

A — Where provided, this designation indicates that additional information is provided regarding the installation of the unit. Such information may be provided in the form of a permanent tag or information sheet attached to the unit.

B — Where provided, this designation indicates that the equipment provides side and bottom enclosures that minimize the risk of spread of fire. Cabinets, racks, and similar equipment identified with an installation code "B" are not intended to completely enclose or limit accessibility to certified subassemblies mounted within the enclosure and are, therefore, not intended for use outside of restricted access locations.

E — Where provided, this designation indicates that the equipment provides a complete enclosure for parts that may present a risk of electric shock, electrical energy/high current levels, or fire and limits

Custom-built Telecommunications Equipment (WYKM)–Continued

accessibility to these parts. Cabinets, racks, and similar equipment identified with an installation code “E” are intended to enclose and limit accessibility to certified subassemblies mounted within the enclosure and may be used outside of restricted access locations.

Marking on Units

The codes are marked in the following format:

Power Code (PC)	In	Out
Telecommunications Code (TC)	F	C
Installation Code (IC)	X	T, X
	A	—

In this example, the “F” Power Code (PC) for the input indicates that the power inputs require overcurrent protection from the equipment that provides power to this unit. The “C” Power Code (PC) for the output indicates that the outputs are limited to levels compatible with communications wiring systems. The “X” input Telecommunications Code (TC) means that the communications circuit inputs are suitable for connection to exposed circuits. The “T” Telecommunications Code (TC) for the output indicates that the unit provides isolation between the exposed circuits connected at the input and the telecommunications output ports. The “X” Telecommunications Code (TC) for the output indicates that the output circuits are also suitable for connection to exposed circuits. The “A” Installation Code (IC) indicates that additional important information is provided on a tag or an attached information sheet. The lack of any other installation codes indicates that the equipment should be installed in restricted access locations over a noncombustible surface or mounted in a suitable enclosure with an “E” or “B” installation code.

Power supplies and assemblies containing power supplies or power distribution components are marked with electrical ratings. Assemblies that present a load on the power system are marked with a load or input rating. The total load ratings for any system should not exceed the power supply/distribution ratings.

Custom-built telecommunications equipment is intended to be installed or situated in a location or position that does not cause excessive heat build-up or interfere with its proper ventilation.

RELATED EQUIPMENT

Complete telephone equipment (e.g., PABXs, telephones, telephone answering machines) is covered under Telephone Appliances and Equipment (WYQQ) or Information Technology Equipment Including Electrical Business Equipment (NWGQ).

Information technology equipment is covered under Information Technology Equipment Including Electrical Business Equipment (NWGQ).

Equipment intended to be installed on the network side of the subscriber demarcation point and installed and maintained by telephone companies, CATV companies, and similar network communications companies is covered under Communications Service Equipment (DUZO).

Cabinet, enclosure and rack/frame systems that are not complete information technology (IT) or telecommunications equipment, but include components and assemblies that are intended to power, protect, heat, cool of otherwise support IT or telecommunications equipment that will be installed at a later time, are covered under Information Technology and Communications Equipment Cabinet, Enclosure and Rack Systems (NWIN).

For additional information, see Telecommunications Equipment (WYIE) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1459, “Telephone Equipment,” or ANSI/UL 60950 or ANSI/UL 60950-1, “Safety of Information Technology Equipment,” and ANSI/UL 60950-21, “Safety of Information Technology Equipment – Remote Power Feeding,” as appropriate.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Custom-built Telecommunication Equipment” (or “Custom Tel Eq.” or “Custom Telecom”).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TELEPHONES, CELLULAR (WYLR)
USE

This category covers hand-held cellular telephones, transportable cellular telephones, and cellular telephone voice-dialers that may be used in house-

Telephones, Cellular (WYLR)–Continued

holds or commercial establishments, or on a vehicle, boat or the like where the telephone interconnects with the telephone network through a radio transmitter and receiver.

FACTORS NOT INVESTIGATED

Possible physiological effects of these devices have not been investigated.

RELATED PRODUCTS

Cell site equipment and similar equipment that forms the “base station” for a cellular communications network, and incorporates the interface to the wired telecommunications network, controllers, amplifiers, and transmitting/receiving equipment is covered under Telephone Appliances and Equipment (WYQQ) or Information Technology Equipment Including Electrical Business Equipment (NWGQ).

ADDITIONAL INFORMATION

For additional information, see Telecommunications Equipment (WYIE) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 6500, “Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use,” UL 60065, “Audio, Video and Similar Electronic Apparatus – Safety Requirements,” UL 1492, “Audio-Video Products and Accessories,” or UL 60950 or UL 60950-1, “Safety of Information Technology Equipment,” as well as the product certification requirements to current FCC Regulations.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Cellular Telephone” (or “Telephone, Cellular”) or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TELEPHONE APPLIANCES AND EQUIPMENT (WYQQ)

GENERAL

This category covers appliances and equipment intended to be electrically connected to a telecommunications network that has an operating voltage to ground that does not exceed 200 V peak, 300 V peak-to-peak or 150 V rms, installed or used in accordance with ANSI/NFPA 70, “National Electrical Code.”

EQUIPMENT TYPES

Examples of equipment covered under this category include:

- Telephones, telephone answering devices, and telephone dialers that do not deliver a recorded message.
- Key telephone systems, automatic telephone call sequencers, customer administration panels, four-wire channel terminating units, intelligent switching subsystems, message transmitters, mounting shelves, PABX (private automatic branch exchange) systems, phone line TV interface systems, remote telephone base stations, telecontrollers, terminals, terminal sets, WATS boxes and cordless telephones.

INSTALLATION

Certain types of telephone appliances and equipment have been investigated for installation only over a noncombustible surface and are marked as such.

Certain types of telephone appliances and equipment have been investigated for installation only in restricted access locations, such as equipment rooms or closets, where access is limited to trained service personnel, and are marked as such.

RELATED EQUIPMENT

Information technology equipment, including other telecommunications appliances and equipment, is covered under Information Technology Equipment Including Electrical Business Equipment (NWGQ).

Modular assemblies (e.g., racks, circuit card assemblies) designed for field installation by trained service personnel are covered under Custom-built Telecommunications Equipment (WYKM).

Equipment intended to be installed on the network side of the subscriber demarcation point and installed and maintained by telephone companies, CATV companies and similar network communications companies is covered under Communications Service Equipment (DUZO).

Cabinet, enclosure and rack/frame systems that are not complete information technology (IT) or telecommunications equipment, but include components and assemblies that are intended to power, protect, heat, cool or oth-

TELECOMMUNICATIONS EQUIPMENT (WYIE)

Telephone Appliances and Equipment (WYQQ)—Continued

erwise support IT or telecommunications equipment that will be installed at a later time, are covered under Information Technology and Communications Equipment Cabinet, Enclosure and Rack Systems (NWIN).

Power distribution centers for communications equipment are covered under Power Distribution Centers for Communications Equipment (QPQY).

Power supplies for information technology and telecommunications equipment are covered under Power Supplies, Information Technology Equipment Including Electrical Business Equipment (QQGQ) and Power Supplies, Telephone (QQJE).

Accessories and Subassemblies

Field-installed accessories and subassemblies (component assemblies) to certified equipment are provided with suitable markings and/or instructions, providing details on proper installation or assembly of the accessory/subassembly with equipment specified in the markings or instructions.

ADDITIONAL INFORMATION

For additional information, see Telecommunications Equipment (WYIE) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1459, "Telephone Equipment."

Certain types of equipment have been investigated for installation in an environmental air space and are provided with a marking or installation instruction, which states "Suitable for Use in Other Environmental Air Space in Accordance with Section 300.22(C) of the National Electrical Code," or similar wording. In such cases, UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and their Accessories Installed in Air-Handling Spaces," has been applied.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Telephone Appliance," "Telephone Equipment," "Telecommunication Equipment," "Telephone Answering Appliance," "Telephone Call Diverter," "Automatic Dialer," or other appropriate product name as shown in the individual Listings.

The product name for field-installed accessories or subassemblies is provided with the additional word "Accessory" or "Subassembly."

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TELEMETERING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (WYMG)

GENERAL

This category covers telemetering transmitter coil assemblies, small generators, pulse generators, fluid-flow indicators and meters, transmitter and receiver units employing selsyn motors, and similar equipment.

The investigation of telemetering equipment marked "Raintight" includes a test designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

Telemetering equipment provided with a factory seal of conductors entering the device enclosure is so identified on the product.

RELATED PRODUCTS

Equipment investigated for use only in the classified locations of automotive and marine service stations is covered under Control, Monitoring and Auxiliary Equipment (EQXX).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names:

TELEMETERING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (WYMG)

"Telemetering Equipment for Use in Hazardous Locations," "Section of Telemetering Equipment for Use in Hazardous Locations," "Telemetering Equipment Relating to Hazardous Locations," "Section of Telemetering Equipment Relating to Hazardous Locations," an appropriate abbreviation, or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TELEMETERING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (WYMV)

GENERAL

This category covers telemetering transmitter coil assemblies, small generators, pulse generators, fluid-flow indicators and meters, transmitter and receiver units employing selsyn motors, and similar equipment.

Investigation of telemetering equipment marked "Rain tight" includes a test designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

Telemetering equipment provided with a factory seal of conductors entering the device enclosure is so identified on the product.

RELATED PRODUCTS

Equipment that has been investigated for use only in the classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product, or the UL symbol on the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Telemetering Equipment for Use in Hazardous Locations," "Section of Telemetering Equipment for Use in Hazardous Locations," "Telemetering Equipment Relating to Hazardous Locations" or "Section of Telemetering Equipment Relating to Hazardous Locations," or other appropriate product name as shown in the individual Listings.

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TELEMETERING EQUIPMENT ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (WYOS)

GENERAL

This category covers retrofit devices and kits consisting of parts and/or subassemblies intended for field installation in certified telemetering equipment. These products have been investigated to determine that when used in accordance with the manufacturer's instructions they do not adversely affect the operation of the complete unit.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

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UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**[PRODUCT IDENTITY*]
FOR USE WITH [specified product]
Control No.**

* The appropriate product name as shown in the individual Classifications

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TELEPHONE EQUIPMENT, LEGACY INSTALLATIONS (WYXR)

USE

This category covers equipment with remote feeding telecommunication circuits intended for backwards compatibility in legacy telecommunication equipment.

This equipment is limited to that which forms part of a telecommunication network up to and including the demarcation point. The circuitry associated with this type of equipment is intended to be installed and located in service access areas only, which may or may not be provided by the equipment housing. This equipment is generally considered central office equipment, though it may be deployed elsewhere in similarly controlled environments.

PRODUCT TYPES

Examples of types of equipment covered under this category are:

- Circuit packs or cards with existing or new technologies designed to be installed into shelf assemblies that form part of a service provider's existing infrastructure.
- Shelf assemblies intended as replacements for existing shelf assemblies mounted in frame line-ups that form part of a service provider's existing infrastructure.
- Shelf assemblies or enclosures intended as replacements for existing service provider infrastructure equipment that are required to be compatible with cards or circuit packs already in service.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2391, "Outline of Investigation for Equipment with Remote Feeding Telecommunication Circuits Intended for Backwards Compatibility in Legacy Telecommunication Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Circuit Pack" or "Shelf Assembly," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TELEPHONES FOR USE IN HAZARDOUS LOCATIONS (WZAT)

USE AND INSTALLATION

This category covers telephones, sound-powered telephones, and communication equipment and systems. Unless identified as intrinsically safe or for use in Division 2 locations only, the equipment is of the explosion-proof design.

The handset and cord assembly should be carefully inspected and should be replaced if there is any evidence of damage or deterioration.

The equipment should be installed in accordance with the installation instructions provided with the product and in accordance with ANSI/NFPA 70, "National Electrical Code."

TELEPHONES FOR USE IN HAZARDOUS LOCATIONS (WZAT)

Station equipment, power-supply equipment, protectors, and other equipment as detailed in the installation instructions should be located outside the hazardous area.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Telephone for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TELEPHONE ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (WZOR)

USE

This category covers dialing units, push-button stations, relays, snap switches, and also conduit boxes having terminal blocks for connection to telephone sets.

ADDITIONAL INFORMATION

For additional information, see Telephones for Use in Hazardous Locations (WZAT) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Telephone Accessory for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

AUTOMATIC ELECTRICAL CONTROLS FOR HOUSEHOLD AND SIMILAR USE (XAAA)

AUTOMATIC ELECTRICAL PRESSURE-SENSING CONTROLS (XAAK)

GENERAL

This category covers automatic electrical pressure-sensing controls with a minimum gauge pressure rating of -8.7 psi and a maximum gauge pressure rating of 609.6 psi intended for use in, on, or in association with equipment for household and similar use for heating, air conditioning, ventilation, and similar applications. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof. They are intended for household or commercial use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

This category does not cover pressure-sensing in-line cord controls and automatic electrical pressure-sensing controls intended exclusively for industrial applications.

These devices are individual controls utilized as part of a control system with or without nonelectrical outputs or controls that are mechanically integral with multifunctional controls having nonelectrical outputs.

Automatic Electrical Pressure-sensing Controls (XAAK)—Continued

The automatic electrical pressure-sensing controls incorporate electronic devices. These products are investigated to the inherent safety, and to the operating values, operating times and operating sequence where such are associated with equipment safety.

When appropriate, these devices are additionally investigated for functional safety during normal and abnormal operation of the controlled appliance.

Class 2 output circuit — A device that incorporates a Class 2 transformer or a Class 2 power source with provision for field wiring of the output circuit is marked to permit wiring as specified in Article 725 of the NEC for the Class 2 circuit.

Ratings — These pressure-sensing controls have a voltage rating not exceeding 600 V. The input, output, and other environmental ratings of the product are based on the manufacturer's declarations and verified through testing.

PRODUCT MARKINGS

Automatic electrical pressure-sensing controls are marked with the company's name or trademark, a distinctive catalog number, and electrical ratings (e.g., volts, amps, hertz, psi, load type). Additional markings may be required based on the individual certification reports.

RELATED PRODUCTS

Automatic electrical pressure-sensing controls intended for gas- and oil-fired appliances, electric central furnaces, boilers and duct heaters are covered under Controls, Primary Safety (MCCZ), Switches (MFHX) and Controls, Limit (MBPR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 60730-1A, "Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements," and UL 60730-2-6, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Pressure Sensing Controls, Including Mechanical Requirements."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Automatic Electrical Pressure-sensing Control."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

ELECTRIC ACTUATORS (XABE)

GENERAL

This category covers electric actuators intended for use in, on, or in association with equipment for household and similar use for heating, air conditioning, ventilation, and similar applications. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof. They are intended for household or commercial use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

This category does not cover electric actuators intended exclusively for industrial applications.

The individual certifications of electric actuators do not include valves or other connected mechanical loads. Motors used in electric actuators are investigated to the appropriate motor standards.

These devices are individual controls utilized as part of a control system with or without nonelectrical outputs or controls that are mechanically integral with multifunctional controls having nonelectrical outputs.

The electric actuators incorporate electronic devices and use thermistors. These products are investigated to the inherent safety, and to the operating values, operating times and operating sequence where such are associated with equipment safety.

When appropriate, these devices are additionally investigated for functional safety during normal and abnormal operation of the controlled appliance.

Electric actuators intended for plenum use are investigated for the application and their fire-resistance and low-smoke-producing characteristics in accordance with UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces."

Electric Actuators (XABE)—Continued

Class 2 output circuit — A device that incorporates a Class 2 transformer or a Class 2 power source with provision for field wiring of the output circuit is marked to permit wiring as specified in Article 725 of the NEC for the Class 2 circuit.

Ratings — These electric actuators have a voltage rating not exceeding 600 V. The input, output, and other environmental ratings of the product are based on the manufacturer's declarations and verified through testing.

PRODUCT MARKINGS

Electric actuators are marked with the company's name or trademark, a distinctive catalog number, and electrical and thermal ratings (e.g., volts, amps, hertz, torque, temperature). Additional markings may be required based on the individual certification reports.

RELATED PRODUCTS

See Releasing Devices for Use in Hazardous Locations (TBJW), Temperature-indicating and -Regulating Equipment for Use in Hazardous Locations (XBDV) and Carbon Dioxide Extinguishing System Units, General Use (FYJR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 60730-1A, "Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements," and UL 60730-2-14, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Electric Actuators."

Where indicated in the individual certifications, electric actuators have also been investigated to the long-term holding test in ANSI/UL 555S, "Smoke Dampers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Thermostat," "Temperature Limiter" or "Thermal Cut-out," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HUMIDITY-SENSING CONTROLS (XACI)

GENERAL

This category covers automatic electric humidity-sensing controls intended for use in, on, or in association with equipment for household and similar use, including electrical controls for heating, air conditioning, ventilation, and similar applications. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof. They are intended for household or commercial use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

This category does not cover automatic electrical humidity-sensing controls intended exclusively for industrial applications.

These devices are individual controls utilized as part of a control system with or without nonelectrical outputs or controls that are mechanically integral with multifunctional controls having nonelectrical outputs.

The humidity-sensing controls incorporate electronic devices and use thermistors. These products are investigated to the inherent safety, and to the operating values, operating times and operating sequence where such are associated with equipment safety.

When appropriate, these devices are additionally investigated for functional safety during normal and abnormal operation of the controlled appliance.

Class 2 output circuit — A device that incorporates a Class 2 transformer or a Class 2 power source with provision for field wiring of the output circuit is marked to permit wiring as specified in Article 725 of the NEC for the Class 2 circuit.

Ratings — These humidity-sensing controls have a voltage rating not exceeding 600 V. The input, output, and other environmental ratings of the product are based on the manufacturer's declarations and verified through testing.

PRODUCT MARKINGS

Humidity-sensing controls are marked with the company's name or trademark, a distinctive catalog number, and electrical and thermal ratings (e.g., volts, amps, hertz, load type, temperature). Additional markings may be required based on the individual certification reports.

ADDITIONAL INFORMATION

PRODUCT CATEGORIES BY CATEGORY CODE

Humidity-sensing Controls (XACI)—Continued

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 60730-1A, "Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements," and UL 60730-2-13A, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Humidity Sensing Controls."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Humidity-sensing Control" or "Room Humidistat," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MISCELLANEOUS CONTROLS (XACN)**GENERAL**

This category covers automatic electrical controls for use in, on, or in association with equipment for household and similar use, including controls for heating, air conditioning, ventilation, and similar applications. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof. They are intended for household or commercial use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

This category does not cover automatic electrical controls intended exclusively for industrial applications.

These controls are mechanically or electrically operated, and are responsive to or control such characteristics as temperature, pressure, passage of time, humidity, light, electrostatic effects, flow or liquid level, current, voltage, acceleration and the like. Automatic controls that do not specifically fall under the scope of other product categories are covered under this category.

These devices are individual controls utilized as part of a control system with or without nonelectrical outputs or controls that are mechanically integral with multifunctional controls having nonelectrical outputs.

The automatic electrical controls incorporate electronic devices and use thermistors. These products are investigated to the inherent safety, and to the operating values, operating times and operating sequence where such are associated with equipment safety.

When appropriate, these devices are additionally investigated for functional safety during normal and abnormal operation of the controlled appliance.

Class 2 output circuit — A device that incorporates a Class 2 transformer or a Class 2 power source with provision for field wiring of the output circuit is marked to permit wiring as specified in Article 725 of the NEC for the Class 2 circuit.

Ratings — These automatic electrical controls have a voltage rating not exceeding 600 V. The input, output, and other environmental ratings of the product are based on the manufacturer's declarations and verified through testing. An input/output circuit that fulfills the requirements for both SELV and limited-energy not exceeding 15 W is considered to address the risk of fire and electric shock. An input/output circuit is marked "Class 2" when the electrical characteristics of the circuits meet the requirements in Article 725 of the NEC, specifically Table 11(A) or 11(B) in Chapter 9, under normal and single-component fault operating condition.

PRODUCT MARKINGS

Automatic electrical controls are marked with the company's name or trademark, a distinctive catalog number, and electrical and thermal ratings (e.g., volts, amps, hertz, load type, temperature). Additional markings may be required based on the individual certification reports.

RELATED PRODUCTS

Automatic controls intended for gas- and oil-fired appliances, electric central furnaces, boilers and duct heaters are covered under Controls, Primary Safety (MCCZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 60730-1A, "Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements," in addition to one or more of the following:
UL 60730-2-2, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Thermal Motor Protectors"
UL 60730-2-3, "Automatic Electrical Controls for Household and Simi-

Miscellaneous Controls (XACN)—Continued

lar Use; Part 2: Particular Requirements for Thermal Protectors for Ballasts for Tubular Fluorescent Lamps"

UL 60730-2-4, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Thermal Motor Protectors for Hermetic and Semi-Hermetic Motor-Compressors"

UL 60730-2-6, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Pressure Sensing Controls, Including Mechanical Requirements"

UL 60730-2-7, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Timers and Time Switches"

UL 60730-2-8, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Electrically Operated Water Valves, Including Mechanical Requirements"

UL 60730-2-9, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Temperature Sensing Controls"

UL 60730-2-10A, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Motor Starting Relays"

UL 60730-2-11A, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Energy Regulators"

UL 60730-2-12A, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Electrically Operated Door Locks"

UL 60730-2-13A, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Humidity Sensing Controls"

UL 60730-2-14, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Electric Actuators"

UL 60730-2-16A, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Water Level Controls of the Float Type for Household and Similar Applications"

UL 60730-2-18, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Water and Air Flow Sensing Controls, Including Mechanical Requirements"

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Foot-actuated Control" or "Electronic Protective Control," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**TEMPERATURE-SENSING CONTROLS
(XACX)****GENERAL**

This category covers automatic electrical temperature-sensing controls for use in, on, or in association with equipment for household and similar use, including electrical controls for heating, air conditioning, ventilation, and similar applications. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof. They are intended for household or commercial use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

This category does not cover automatic electrical temperature-sensing controls intended exclusively for industrial applications.

These devices are individual controls utilized as part of a control system with or without nonelectrical outputs or controls that are mechanically integral with multifunctional controls having nonelectrical outputs.

The automatic electrical temperature-sensing controls incorporate electronic devices and use thermistors. These products are investigated to the inherent safety, and to the operating values, operating times and operating sequence where such are associated with equipment safety.

When appropriate, these devices are additionally investigated for functional safety during normal and abnormal operation of the controlled appliance.

Class 2 output circuit — A device that incorporates a Class 2 transformer or a Class 2 power source with provision for field wiring of the output circuit is marked to permit wiring as specified in Article 725 of the NEC for the Class 2 circuit.

Equipment intended for agricultural use — Controls marked to indicate use in agricultural buildings in accordance with Article 547 of the NEC have been tested in the environmental conditions of 547.1(A) and 547.1(B) of the NEC.

**AUTOMATIC ELECTRICAL CONTROLS FOR HOUSEHOLD
AND SIMILAR USE (XAAA)**
Temperature-sensing Controls (XACX)—Continued

Ratings — These temperature-sensing controls have a voltage rating not exceeding 600 V. The input, output, and other environmental ratings of the product are based on the manufacturer's declarations and verified through testing.

PRODUCT MARKINGS

Automatic temperature-sensing controls are marked with the company's name or trademark, a distinctive catalog number, and electrical and thermal ratings (e.g., volts, amps, hertz, load type, temperature). Additional markings may be required based on the individual certification reports.

RELATED PRODUCTS

Automatic controls intended for gas- and oil-fired appliances, electric central furnaces, boilers and duct heaters are covered under Controls, Primary Safety (MCCZ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 60730-1A, "Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements," and UL 60730-2-9, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Temperature Sensing Controls."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Thermostat," "Temperature Limiter" or "Thermal Cut-out," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TEMPERATURE-INDICATING AND -REGULATING EQUIPMENT (XAPX)

GENERAL

This category covers electrical controls designed for heating and cooling equipment, room temperature or humidity regulation, and industrial uses. They are intended for household, commercial or industrial use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

These devices respond directly or indirectly to changes in temperature, humidity, or pressure to affect temperature control of equipment or appliance operation, etc. These devices may be investigated for functioning during the normal operation (regulating) of the controlled appliance or for functioning in the event of an abnormal condition (limiting) of the controlled appliance.

Ratings — Temperature-indicating and -regulating equipment is certified with a maximum rating of 600 V. A control rated in amps is tested with an inductive (75-80% power factor) load for alternating-current ratings unless a direct-current (noninductive) rating is specified.

Manual reset controls — An "M1" or "M2" marking indicates the following manual reset functions are provided:

- **M1** — Controls that automatically reset to the "closed" position after normal operating conditions have been restored if the reset means is held in the "reset" position.
- **M2** — Controls that do not automatically reset to the "closed" position if the reset means is held in the "reset" position.

Room thermostats — Room thermostats intended for the direct control of electric space-heating equipment that are to be permanently connected electrically and are provided with a marked or implied "off" position, disconnect all ungrounded poles of the supply circuit when adjusted to the "off" position.

Equipment suitable for outdoor use — Equipment identified with an enclosure type designation or as "Rain tight" or "Rainproof" is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Class 2 output circuits — A device that incorporates a Class 2 transformer or a Class 2 power source with provision for field wiring of the output circuit is marked to permit wiring as specified in Article 725 of the NEC for the Class 2 circuit.

Equipment intended for agricultural use — A control marked to indicate use in agricultural buildings in accordance with Article 547 of the NEC has been tested in the environmental conditions of Paragraph 547.1(A) and 547.1(B) of the NEC.

**TEMPERATURE-INDICATING AND -REGULATING EQUIPMENT
(XAPX)**

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Motor operators — The individual certifications of motor operators do not include valves or other connected mechanical loads.

PRODUCT MARKINGS

Temperature-indicating and -regulating equipment is marked with the company's name or trademark, a distinctive catalog number, and the electrical ratings. Additional markings may be required based on the individual certification reports.

RELATED PRODUCTS

Safety controls for gas- and oil-fired appliances, electric central furnaces, boilers and duct heaters are covered under Controls, Limit (MBPR), Controls, Primary Safety (MCCZ) or Switches (MFHX).

Controls for refrigeration and air conditioning (except remote, wall-mounted room thermostats) are covered under Controllers, Refrigeration (SDFY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 873, "Temperature-Indicating and -Regulating Equipment," or UL 60730-1, "Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements," in addition to one of the following as applicable:

- ANSI/UL 60730-2-2, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Thermal Motor Protectors"
 - UL 60730-2-3, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Thermal Protectors for Ballasts for Tubular Fluorescent Lamps"
 - UL 60730-2-4, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Thermal Motor Protectors for Hermetic and Semi-Hermetic Motor-Compressors"
 - UL 60730-2-6, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Pressure Sensing Controls, Including Mechanical Requirements"
 - ANSI/UL 60730-2-9, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Temperature Sensing Controls"
 - UL 60730-2-10A, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Motor Starting Relays"
 - UL 60730-2-11A, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Energy Regulators"
 - UL 60730-2-12A, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Electrically Operated Door Locks"
 - UL 60730-2-13A, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Humidity Sensing Controls"
 - UL 60730-2-14, "Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Electric Actuators"
- Where indicated in the individual certifications, electric actuators have also been investigated to the long-term holding test in ANSI/UL 555S, "Smoke Dampers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Temperature Indicating Equipment," "Temperature Regulating Equipment" or "Temperature-indicating and -Regulating Equipment" (or "Temp. Ind. and Reg. Equip."), or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TEMPERATURE-INDICATING AND -REGULATING EQUIPMENT, ELECTRICAL (XATJ)

GENERAL

This category covers electrical controls designed for heating and cooling equipment, room temperature or humidity regulation, and industrial uses. They are intended for household, commercial or industrial use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

These devices respond directly or indirectly to changes in temperature, humidity, or pressure to effect temperature control or equipment or appli-

TEMPERATURE-INDICATING AND -REGULATING EQUIPMENT, ELECTRICAL (XATJ)

ance operation, etc. These devices may be investigated for functioning during the normal operation (regulating) of the controlled appliance or for functioning in the event of an abnormal condition (limiting) of the controlled appliance.

Ratings — Temperature-indicating and regulating equipment is certified with a maximum rating of 600 V. A control rated in amperes is tested with an inductive (75-80% power factor) load for alternating current ratings unless a direct current (noninductive) rating is specified.

Manual reset controls — An “M1” or “M2” marking indicates the following manual reset functions are provided:

- **M1** – Controls that automatically reset to the “closed” position after normal operating conditions have been restored, if the reset means is held in the “reset” position.
- **M2** – Controls that do not automatically reset to the “closed” position if the reset means is held in the “reset” position.

Room thermostats — Room thermostats intended for the direct control of electric space heating equipment that are to be permanently connected electrically and are provided with a marked or implied “off” position, disconnect all ungrounded poles of the supply circuit when adjusted to the “off” position.

Equipment suitable for outdoor use — Equipment identified with an enclosure type designation or as “Rain tight” or “Rainproof” is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Class 2 output circuits — A device that incorporates a Class 2 transformer or a Class 2 power source with provision for field wiring of the output circuit is marked to permit wiring as specified in Article 725 of the NEC for the Class 2 circuit.

Equipment intended for agricultural use — A control marked to indicate use in agricultural buildings in accordance with Article 547 of the NEC has been tested in the environmental conditions of 547.1(A) and 547.1(B) of the NEC.

Motor operators — The certifications of motor operators do not include valves or other connected mechanical loads.

PRODUCT MARKINGS

Temperature-indicating and regulating equipment is marked with the company’s name or trademark, a distinctive catalog number, and the electrical ratings. Additional markings may be required based on the individual certification reports.

RELATED PRODUCTS

Safety controls for gas- and oil-fired appliances, electric central furnaces, boilers and duct heaters are covered under Controls, Limit (MBPR), Controls, Primary Safety (MCCZ) or Switches (MFHX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 60730-1A, “Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements,” together with the following appropriate Part 2 Standards:

- UL 60730-2-3, “Particular Requirements for Thermal Protectors for Ballasts for Tubular Fluorescent Lamps”
- UL 60730-2-4, “Particular Requirements for Thermal Motor Protectors for Motor-Compressors of Hermetic and Semi-Hermetic Type”
- UL 60730-2-6, “Particular Requirements for Automatic Electrical Pressure Sensing Controls Including Mechanical Requirements”
- UL 60730-2-9, “Particular Requirements for Temperature Sensing Controls”
- UL 60730-2-10A, “Particular Requirements for Motor Starting Relays”
- UL 60730-2-13A, “Particular Requirements for Humidity Sensing Controls”
- UL 60730-2-14, “Particular Requirements for Electric Actuators”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Temperature Indicating Equipment” or “Temperature Regulating Equipment,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TEMPERATURE-INDICATING AND -REGULATING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (XBAI)

TEMPERATURE-INDICATING AND -REGULATING EQUIPMENT FOR USE IN ZONE CLASSIFIED HAZARDOUS LOCATIONS (XBAI)

USE AND INSTALLATION

This category covers electrical controls for heating and cooling equipment, room temperature or humidity regulation, and industrial uses. These devices respond directly or indirectly to changes in temperature, humidity, or pressure to affect temperature control, or equipment or appliance operation, etc.

RATINGS

Temperature-indicating and -regulating equipment is certified with a maximum rating of 600 V.

Controls intended for across-the-line motor starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for alternating-current motor ratings and at ten times motor full load running current for direct-current motor ratings.

A switching device rated in “pilot duty” is intended for control of electromagnetic loads, such as the solenoid of a motor controller or electrically operated valve, and is tested with an appropriate electromagnetic load.

A control rated in amps is tested with an inductive (75 – 80% power factor) load for alternating-current ratings unless a noninductive rating is specified, and with a noninductive load for a direct-current rating.

The certifications of motor operators do not include valves or other connected mechanical loads.

The thermostats in the individual certifications can be adjusted, or are preset to operate at various temperature settings. The exterior surfaces of the equipment to which the thermostats, or remote bulbs of the thermostats, are attached should not exceed the maximum safe temperature for the hazardous locations involved.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 873, “Temperature-Indicating and -Regulating Equipment.”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Zone Classified Hazardous Locations (AANZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Thermostat for Use in Hazardous Locations,” “Temperature-indicating Equipment for Use in Hazardous Locations” or “Temperature-indicating Equipment (Associated Apparatus),” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TEMPERATURE-INDICATING AND -REGULATING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (XBDV)

GENERAL

This category covers electrical controls designed for heating and cooling equipment, room temperature or humidity regulation, and industrial uses. These devices respond directly or indirectly to changes in temperature, humidity, or pressure to effect temperature control, or equipment or appliance operation, etc.

Temperature-indicating and -regulating equipment is certified with a maximum rating of 600 V. A control rated in amps is tested with an inductive (75-80% power factor) load for alternating-current ratings unless a non-inductive rating is specified, and with a noninductive load for a direct-current rating.

Controls intended for across-the-line motor starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and

at six times motor full-load running current for alternating-current motor ratings, and at ten times motor full-load running current for direct-current motor ratings.

A switching device rated in "pilot duty" is intended for control of electromagnetic loads, such as the solenoid of a motor controller or electrically-operated valve, and is tested with an appropriate electromagnetic load.

The motor operators in this category do not include valves or other connected mechanical loads.

The thermostats covered under this category can be adjusted, or are preset to operate at various temperature settings. The exterior surfaces of the equipment to which the thermostats, or remote bulbs of the thermostats, are attached should not exceed the maximum safe temperature for the hazardous locations involved.

Equipment marked "rain tight" has been subjected to tests designed to simulate exposure to a beating rain to determine that such exposure will not result in entrance of water.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 873, "Temperature-Indicating and -Regulating Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Thermostat for Use in Hazardous Locations," "Temperature-indicating Equipment for Use in Hazardous Locations" or "Temperature-indicating Equipment (Associated Apparatus)," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**TEMPORARY-LIGHTING STRINGS
(XBRT)**

USE AND INSTALLATION

This category covers temporary-lighting strings rated 20 A, 125 V, intended for use indoors and outdoors to provide temporary illumination in accordance with Article 590 of ANSI/NFPA 70, "National Electrical Code."

Temporary-lighting strings consist of a factory assembly of flexible cord or cable incorporating a series of Edison-base lampholders provided with lamp guards. The flexible cord may be terminated at one end with an attachment plug, for connection to the source of supply, and with a cord connector at the opposite end. If an attachment plug is not provided, the temporary-lighting string is provided with instructions for proper connection to the source of supply.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1088, "Temporary Lighting Strings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Temporary Lighting String."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**RELOCATABLE POWER TAPS
(XBYS)**

USE AND INSTALLATION

This category covers relocatable power taps rated 250 V ac or less, 20 A or less. They are intended for indoor use as relocatable multiple outlet extensions of a single branch circuit to supply laboratory equipment, home workshops, home movie lighting controls, musical instrumentation, and to provide outlet receptacles for computers, audio and video equipment, and other equipment.

Relocatable power taps consist of:

- a) One attachment plug and a single length of flexible cord terminated in a single enclosure in which one or more receptacles may be mounted, or
- b) One attachment plug and a single length of flexible cord terminated in a single enclosure in which one or more receptacles may be mounted. Up to six lengths of flexible cord, not exceeding 1-1/2 ft in length, may exit the enclosure with each length terminating in a separate, single cord connector, or
- c) One attachment plug and a single length of flexible cord terminated in an enclosure in which one or more receptacles may be mounted. A second enclosure in which one or more receptacles may be mounted that is interconnected to the first enclosure with flexible cord, maximum 1-1/2 ft long, may be employed. An interconnected switch housing may also be employed to remotely control the relocatable power tap, provided that the length of the flexible cord between the enclosure and switch housing is not greater than 6 ft.

They may, in addition, be provided with fuses or other supplementary overcurrent protection, switches, suppression components and/or indicator lights in any combination, or connections for cable, communications, telephone and/or antenna.

Relocatable power taps are intended to be directly connected to a permanently installed branch circuit receptacle. Relocatable power taps are not intended to be series connected (daisy chained) to other relocatable power taps or to extension cords.

Relocatable power taps are not intended for use at construction sites and similar locations.

Relocatable power taps are not intended to be permanently secured to building structures, tables, work benches or similar structures, nor are they intended to be used as a substitute for fixed wiring. The cords of relocatable power taps are not intended to be routed through walls, windows, ceilings, floors or similar openings.

The length of the power-supply cord, as measured from the outside surface of the enclosure of the relocatable power tap to the plane of the face of the attachment plug, should not exceed 25 ft (7.62 m) nor be less than 1.5 ft (0.46 m).

Relocatable power taps have not been investigated and are not intended for use with general patient care areas or critical patient care areas of health care facilities as defined in Article 517 of ANSI/NFPA 70, "National Electrical Code."

RELATED PRODUCTS

Relocatable power taps employing cord sets provided with leakage-current detection and interruption are covered under Cord Sets with Leakage-current Detection and Interruption (ELGN).

Portable ground-fault circuit interrupters are covered under Ground-fault Circuit Interrupters (KCXS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1363, "Relocatable Power Taps."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Relocatable Power Tap," "Power Tap" or "Outlet Strip."

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TERMINATION BOXES (XCKT)

GENERAL

This category covers termination boxes rated 600 V or less that consist of lengths of busbars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors or both, or with provision for inlet assemblies for incoming conductors. Termination boxes are intended to be used in accordance with ANSI/NFPA 70, "National Electrical Code." Termination boxes have a rating in amperes based on the size of the bus located within the termination box.

Termination boxes do not contain switching devices, overcurrent protective devices, or any control components (see **RELATED PRODUCTS**).

This category also covers termination bases to be field installed in termination boxes, and termination boxes in which termination bases are to be field installed.

USE AND INSTALLATION

Termination boxes rated and marked for use on the line side of service equipment may also be used on the load side of service equipment. Termination boxes not marked for use on the line side of service equipment and rated 100 A or less are only for use on the load side of service equipment.

Termination boxes may have knockouts or openings for the connection of cable fittings, conduit or electrical metallic tubing. They may also have openings for connection with openings in other equipment, such as meter sockets, panelboards, switch or circuit breaker enclosures, wireways, raceways and the like.

Termination boxes provided with inlet assemblies may consist of a single multi-pole inlet assembly or multiple single-pole inlets installed in a completely enclosed assembly. Single multi-pole inlets are suitable for connection and disconnection under load. Single-pole inlets are not intended to be used for the connection to, disconnection from, or transfer of loads.

Termination boxes are generally freestanding structures or can be mounted on to a post or pedestal.

A mounting post is intended to be mounted in concrete at grade level or below or is intended to be secured to some other mounting support. A mounting post is marked with a grade level line to which the post should be encased.

A mounting pedestal is intended to be mounted to a concrete slab.

A mounting post or pedestal either has ventilation to inhibit condensation or is provided with instructions indicating the correct mounting procedure.

Unless marked otherwise, a mounting post or pedestal is intended to be self-supporting, and is not intended to serve as the support of a mast for overhead wiring.

PRODUCT MARKINGS

Termination boxes are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Termination boxes intended for use with field-installed wire connectors are marked stating which pressure terminal connectors, component terminal assemblies or termination bases are to be used.

Factory-installed field wiring connectors requiring the use of a special tool (such as crimp connectors) are provided with instructions concerning the proper tool to be used for the termination of conductors.

Termination boxes are marked with their short-circuit current ratings in rms symmetrical amps and with the words "Short-Circuit Current Rating."

Termination boxes are marked with an enclosure type as described in Electrical Equipment for Use in Ordinary Locations (AALZ). Termination boxes marked with an enclosure Type designation of Type 3, 3S, 4, 4X, 6 or 6P may additionally be marked "Raintight." A termination box marked Type 3R may additionally be marked "Rainproof."

Termination boxes suitable for use on the line side of service equipment are marked "Suitable for Use on the Line Side of Service Equipment," or equivalent.

RELATED PRODUCTS

Equipment connected only by busbars to both input and output circuits and equipment known as "end cable tap boxes" are covered under Busways and Associated Fittings (CWFT).

Equipment containing switching devices, relays or overcurrent devices is covered under the appropriate category; see Switchboards (WEIR), Industrial Control Equipment (NIMX) or Panelboards (QEUY).

Posts or pedestals intended to support and feed distribution equipment such as a power outlet, panelboard, or circuit breaker enclosure are covered under Mounting Posts and Pedestals for Distribution Equipment (PUPR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1773, "Termination Boxes."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Ser-

vice. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Termination Box," or the name of the specific type of product as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

THERMAL BARRIER SYSTEMS (XCLF)

GENERAL

Thermal barrier systems consist of components and materials intended for installation as protection for electrical wiring systems specified in the individual system designs with respect to heat transmission from exterior fire exposure. The specifications for the thermal barrier systems and their assembly are important details in the development of the ratings. Information concerning these details are described in the individual systems. System components identified with an (*) in the description text are Classified under the Classification and Follow-Up Service Program of UL. Such components and names of manufacturers who are authorized to apply the Classification Mark are identified under the specific product category.

Ratings apply only to the entire thermal barrier system. Individual components and materials are designed for use in a specific system(s) for which corresponding ratings have been developed and are not intended to be interchanged between systems. Ratings are not assigned to individual system components or materials.

Classification of these thermal barrier systems contemplates installation in interior environments with representative heating and air conditioning, unless stated otherwise in the individual Classifications.

The products used in these systems are intended to be installed in accordance with the applicable accompanying instructions. Authorities Having Jurisdiction should be consulted as to the specific requirements covering the installation and use of these Classified systems.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

BATTS AND BLANKETS (XCLR)

USE AND INSTALLATION

This category covers insulating batts and blankets used to wrap electrical wiring systems in accordance with the application instructions provided with the product, and as specified in the individual thermal barrier system.

Authorities Having Jurisdiction should be consulted before installation.

FACTORS NOT INVESTIGATED

Properties of these materials, other than the degree of fire resistance to specific electrical wiring systems, have not been investigated.

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate the thermal barrier systems in which these products are installed is ASTM E1725 (2008), "Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components."

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

BATTS AND BLANKETS FOR USE IN THERMAL BARRIER SYSTEMS SEE UL FIRE RESISTANCE DIRECTORY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

THERMAL PROTECTION FOR MOTORS (XCSZ)

ELECTRONICALLY PROTECTED MOTORS WITH INTEGRAL CONTROLLERS FOR INDUSTRIAL USE (XDNZ)

GENERAL

This category covers industrial-use motors:

- intended to be field installed in accordance with Article 430 of ANSI/NFPA 70, "National Electrical Code,"
- intended only for industrial use,
- having an electronic control, integral to the motor, and
- where the control provides overtemperature protection for the motor.

These motors are controlled and protected by:

- solid-state motor starters/controllers that are integral to the motor, and/or
- open or enclosed equipment integral to the motor that supply power to control a motor or motors operating at a frequency or voltage different than that of the input supply.

These motors comply with the requirements for running and locked-rotor protection, or comply with the requirements for locked-rotor protection only and are for use where running protection is not required.

The solid-state circuitry providing the protection for products covered under this category has not been investigated for reliability.

INSTALLATION

All motors are provided with installation information that indicates the proper methods to secure the motor and electrically connect the motor to the power source.

Motors covered under this category are not intended to be installed in an enclosure unless a marking on the motor, the installation instructions or a stuffer sheet provided with the motor states that the motor may be enclosed. Specifications for the enclosure are included with the instructions or marking.

When conduit hubs are not provided for a Type 2, 3, 3R, 3S or 5 enclosure, the enclosure, the instruction sheet provided with the enclosure, or the packaging carton is marked to indicate raintight or wet-location hubs that comply with the requirements in ANSI/UL 514B, "Conduit, Tubing, and Cable Fittings," are intended to be used.

A separable conduit hub and a closure fitting are marked with the manufacturer's name or trademark and the catalog number or equivalent. Such a hub or fitting may be shipped separately, and any gasket, hardware, and instructions necessary for installation is shipped with the fitting or packaged with the enclosure.

An enclosure marked Type 4, 4X, 6 or 6P is provided with instructions for use of the watertight connection if the connection is not mounted on the enclosure.

Installation instructions are provided with an enclosure intended for field assembly of the bonding means that identifies the parts for bonding and specifies the method of installation.

Instructions are provided with the enclosure indicating that when installed in a Type 2 or 3R environment, the drain hole plug is intended to be removed.

PRODUCT MARKINGS

An enclosed-type motor has the Enclosure Type designation marked on the motor for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

All motors are intended for use in a 40°C (104°F) ambient unless marked for a different ambient.

These motors are marked with:

- Manufacturer's name or identification.
- Motor catalog or model number.
- Rated voltage.
- Full-load amperes, watts or kilowatts, or both.
- Rate speed.
- Rated horsepower or output wattage.
- Rated temperature rise or the insulation system class.
- Rated ambient temperature.
- Rated frequency, expressed in one of the following terms: hertz (Hz); ac-dc (frequency in Hz)/dc (e.g., 60/dc); ac only; direct current.
- Number of phases.
- A continuous-duty motor is marked "Continuous" (or "CONT").
- A direct-current motor is marked to indicate the winding type: straight shunt, stabilized shunt, compound or series.
- A multi-speed motor is marked with the amperes and horsepower at each speed.

These motors are marked to indicate the temperature rating (e.g., 60°C only, 60/75, or 75°C only) of the field-installed conductors for which the equipment has been investigated.

A motor manufactured at more than one factory is marked to uniquely identify the factory of manufacture.

Electronically Protected Motors with Integral Controllers for Industrial Use (XDNZ)—Continued

Motors equipped with electrically powered condensation-prevention heaters are marked with the rated heater voltage, number of phases, and the rated power in watts.

Air-over motors are marked "Air Over" (or "AO") or "Air-Over Motor" (or "AOM").

An alternating-current motor is marked with a code letter to indicate the locked-rotor amperes in accordance with the NEC.

A wound-rotor induction motor is marked with the secondary volts and full-load amperes.

A motor rated for short-time or intermittent duty is marked on the nameplate with the words "intermittent duty" (or "int. duty") and with the time rating in minutes or hours, or a combination of minutes and hours. The rating may be for "On" time only or include specifications for both "On" and "Off" periods.

If the acceptability of a Type 2 or 3R enclosure is dependent upon a particular mounting orientation, the enclosure is marked to indicate the required orientation.

A cast-metal enclosure marked Type 3, 3R or 3S is marked to indicate that, after determining the mounting position of the enclosure, any holes drilled in the field are intended to be located in the lowest part of the bottom wall.

Exception: If a manufacturer intends that a cast-metal enclosure be acceptable for field drilling and tapping of holes for conduit connections, the enclosure is marked to indicate the location and trade sizes of conduit for which the enclosure has been found to be acceptable. If counter-boring is necessary to accommodate certain sizes of conduit, such information is also given.

Note: The instructions for drilling and tapping may be provided on an instruction sheet provided with the enclosure or marked on the packaging carton.

Any environmental-type enclosure intended for use with conduit hubs, and/or other field-installed equipment, but shipped from the factory without them, is marked or provided with instructions that identify the type of equipment intended to be used to maintain the environmental integrity of the enclosure. This may be accomplished by identifying the necessary environmental type designation or by identifying the specific manufacturer and model number of the field-installed equipment.

RELATED PRODUCTS

Motors intended for use in hazardous (classified) locations are covered under Motors for Use in Hazardous Locations (PTDR), Motors, Specialty for Use in Hazardous Locations (PUCJ), and Motors, Division 2 for Use in Hazardous Locations (PTHE).

Similar motors incomplete in construction and intended for factory installation are covered under Electronically Protected Motors with Integral Controllers for Industrial Use (XDNZ).

Electronically protected motors intended for residential or commercial use are covered under Electronically Protected Motors (XDNW).

Electronically controlled motors are covered under Motors (PRGY or PRGY).

Products Verified for energy efficiency are covered under Electric Motors Verified for Energy Efficiency (ZWK).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are one or more of the following:

- ANSI/UL 2111, "Overheating Protection for Motors"
- ANSI/UL 1004-1, "Rotating Electrical Machines - General Requirements"
- ANSI/UL 1004-3, "Thermally Protected Motors"
- ANSI/UL 1004-7, "Electronically Protected Motors"
- ANSI/UL 508, "Industrial Control Equipment"
- ANSI/UL 508C, "Power Conversion Equipment"

Where indicated in the individual certifications, the spacings provided within these motors have additionally been investigated to ANSI/UL 840, "Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electronically Protected Motor for Industrial Use."

THROUGH-PENETRATION FIRESTOP SYSTEMS (XHEZ)

GENERAL

This category covers firestop systems, which are specific constructions consisting of a wall or floor assembly, a penetrating item passing through an opening in the wall or floor assembly, and the materials designed to prevent the spread of fire through the openings. The specifications for materials in a firestop system and the assembly of the materials are details that directly relate to the established ratings. Information concerning these details is described in the individual systems. The hourly ratings apply only to the complete systems. Individual components are designated for use in a specific system to achieve specified ratings. The individual components are not assigned ratings and are not intended to be interchanged between systems. Additionally, the substitution or elimination of components required in a system should not be made unless specifically permitted in the individual system or in these general guidelines.

The firestop systems covered under this category have been investigated with a positive furnace pressure differential of at least 0.01 in. of water maintained at a distance of 12 in. below horizontal test assemblies and 0.78 in. below the fill materials surrounding the penetrating items passing through vertical test assemblies. The Classifications of firestop systems contemplate installation in heated and air conditioned environments unless stated otherwise in the description of the system.

ANSI/UL 1479, "Fire Tests of Through-Penetration Firestops," defines the criteria for hourly F, T, L and W ratings for firestop systems. The F-rating criteria prohibits flame passage through the system and requires acceptable hose-stream test performance. The T-rating criteria prohibits flame passage through the system and requires the maximum temperature rise on the unexposed surface of the wall or floor assembly, on the penetrating item and on the fill material not to exceed 325°F (181°C) above ambient, and requires acceptable hose-stream test performance.

The L-rating criteria determines the amount of air leakage, in cu feet per minute per square foot of opening (CFM/sq ft) or in cu feet per minute per unit (CFM/unit) for fixed-size opening units, through the firestop system at ambient and/or 400°F air temperatures at an air-pressure differential of 0.30 in. W.C. The L ratings are intended to assist Authorities Having Jurisdiction and others in determining the suitability of firestop systems for the protection of penetrations and miscellaneous openings in floors and smoke barriers for the purpose of restricting the movement of smoke in accordance with ANSI/NFPA 101, "Life Safety Code."

The Class 1 W rating determines the capability of the firestop system to maintain watertightness of the penetration through a floor or wall construction at ambient air conditions under 3 ft of water pressure head (1.3 psi) for a period of 72 hours. The W rating may be applicable for building structures whose floors are subjected to incidental standing water and/or for buildings that house critical equipment as described in ANSI/NFPA 75, "Fire Protection of Information Technology Equipment," and ANSI/NFPA 76, "Fire Protection of Telecommunications Facilities."

Acceptance is based upon the ability of the firestop system to withstand the applied pressure without the passage of any water through the firestop system. After the Class 1 watertightness test, the firestop system is conditioned in accordance with the requirements of ANSI/UL 1479 and the fire and hose stream tests described in the standard are conducted.

The W rating is intended to assist Authorities Having Jurisdiction and others in determining the suitability of firestop systems in applications where submersion in water may be a factor.

Materials used in the firestop systems are intended to be installed in accordance with the manufacturer's instructions provided with the materials. The structural integrity of the floor or wall assembly needs to be investigated when providing openings for the penetrating items. The fill, void or cavity material thickness published in the fire-resistance designs is measured wet and may be susceptible to a percentage of shrinkage during the curing process. Firestop systems are investigated after the fill, void or cavity materials are fully cured. Refer to the individual Classifications under Fill, Void or Cavity Materials (XHHW) for the investigated percentage of shrinkage.

The minimum and/or maximum annular space referenced in the firestop system must be maintained in order to achieve the hourly rating of the system. The annular space of a penetrating item through a rectangular opening is determined by measuring the distance from the closest point of the penetrating item to a point perpendicular to each of the four sides of the opening. The diagonal dimension is not intended to represent the annular space of a rectangular opening. The annular space between multiple penetrating items within a rectangular opening is determined by measuring the closest point of one penetrating item to the closest point of the adjacent penetrating item.

ANSI/NFPA 90A, "Installation of Air-Conditioning and Ventilating Systems," contains requirements on the use of fire dampers in conjunction with ventilation ducts. Unless specifically indicated as part of the Classification of

the damper, the annular space around the damper sleeve should not be firestopped with the materials described herein.

The systems covered under this category are Classified with respect to (1) installation in a wall only, (2) installation in a floor only or (3) installation in either a wall or a floor. Unless otherwise indicated in the systems, the ratings for firestop systems installed in walls apply when either face of the wall is exposed to fire. The ratings for firestop systems installed in a floor apply when the underside or ceiling surface is exposed to fire.

The hourly fire-endurance rating of the walls and floors incorporating these systems are not indicated. Volume 1 of the Fire Resistance Directory covers the hourly fire-endurance ratings of floor and wall assemblies. Firestop systems that specify installation in concrete floors may include installation in floors consisting of fluted or corrugated steel deck topped with structural concrete, provided that (1) the concrete topping thickness measured above the top plane of the steel deck is equal to or greater than the minimum concrete thickness specified in the system, and (2) the firestop system does not require any portion of the forming material or fill material to extend below the bottom plane of the floor.

Some firestop systems specify the use of hollow-core precast concrete unit floor assemblies. Where not specified, firestop systems utilizing caulk, sealant, putty or spray materials installed over a mineral wool or ceramic blanket may be installed in hollow-core floors, provided that (1) the thickness of the hollow-core floor is equal to or greater than the minimum concrete thickness specified in the system, (2) the maximum size of the opening is 7 in. diameter or 7 in. by 7 in., and (3) any cores of the precast concrete units penetrated as a result of the firestop system are sealed with a minimum 4 in. depth of either firmly packed minimum 4 pcf mineral wool or ceramic fiber blanket, or concrete, grout or mortar. Additionally, firestop systems utilizing a firestop device or wrap strips/steel collar installed around the penetrant beneath the floor may be installed in hollow-core floors, provided that (1) the thickness of the hollow-core floor is equal to or greater than the minimum concrete thickness specified in the system, and (2) the maximum size of the opening is 7 in. diameter or 7 in. by 7 in.

ANSI/NFPA 70, "National Electrical Code" (NEC), contains requirements for permissible installation and percentages of electrical conductor fill for conduit, cable trays and other electrical conductor raceways.

Authorities Having Jurisdiction should be consulted as to the particular requirements covering the installation and use of these Classified systems.

PENETRATING ITEMS

When the penetrating item is indicated as being conduit, the conduit is intended for use as a raceway for electrical conductors in accordance with the NEC. Electrical conductors may be used without conduit only when permitted by and installed in accordance with the NEC, and when the conductors are specifically described in the firestop system. The maximum conductor size and the maximum number of conductors in the individual cables are specified in each system. All electrical conductors are intended to be copper unless indicated otherwise in the system.

When the penetrating item is indicated as being pipe, the pipe is intended for the transport of gases, liquids and the like. The maximum diameter, the minimum wall thickness and the specific material for conduit and pipes are specified in each system. All nonmetallic pipe is intended to be of the solid-core type unless indicated otherwise in the system.

Further specifications for the various types of penetrating items may be found in the documents referenced below:

Penetrating Item	Document
Electrical metallic tubing (EMT)	ANSI/UL 797
Intermediate metal conduit (IMC)	ANSI/UL 1242
Rigid metal conduit	ANSI/UL 6
Copper tubing	ASTM B88
Copper pipe	ASTM B42
Flexible metal conduit	ANSI/UL 1
Liquid-tight flexible nonmetallic conduit	ANSI/UL 1660
Rigid nonmetallic PVC conduit	ANSI/UL 651
Electrical nonmetallic tubing (ENT)	ANSI/UL 1653
Cross-linked polyethylene (PEX) tubing	ANSI/ASTM D2737
Solid-core polyvinyl chloride (PVC) pipe	ANSI/ASTM D1785 and ANSI/ASTM D2665
Cellular-core polyvinyl chloride (PVC) pipe	ANSI/ASTM F891
Chlorinated polyvinyl chloride (CPVC) pipe	ANSI/ASTM F442
Solid-core acrylonitrile butadiene styrene (ABS) pipe	ANSI/ASTM D1527 and ANSI/ASTM D2661
Cellular-core acrylonitrile butadiene styrene (ABS) pipe	ANSI/ASTM F628
Polybutylene (PB) pipe	ASTM D3000
Polyvinylidene fluoride (PVDF) pipe	ANSI/ASTM F1673
Fiberglass pipe	ANSI/ASTM D2997

Where the individual system specifies the penetrating item is to be rigidly supported on both sides of wall or floor, the support system should be designed based upon the premise the firestop system provides no support.

THROUGH-PENETRATION FIRESTOP SYSTEMS (XHEZ)

Where the penetrating item is indicated as a metallic pipe, conduit, tube, duct or cable, and the firestop system consists of a fill material (such as sealants, putty or mortar) and a packing material, the penetrant may pass through the opening in the wall or floor assembly at an angle, provided the annular space is maintained on both sides of the wall or floor assembly. In all other cases, except where otherwise indicated in the system, the penetrating item should penetrate the wall or floor assembly at a 90° angle.

Some systems do not include penetrating items. These firestop systems are intended to be used to seal openings where the penetrating items have been removed or where the penetrating items have not yet been installed.

FORMING MATERIALS

Forming materials specified for a firestop system should not be removed after cure of the fill material, unless removal is specified in the description of the system.

The installation contractor and Authority Having Jurisdiction should ensure the specified properties of the packing and/or forming material are satisfied as noted in the individual Classifications. Such properties may include material type (mineral wool, backer rod, fiberglass, etc.), physical properties (size, density, etc.) and installation (depth, orientation, compression, etc.). Attention should also be given to ensure the installed material matches the manufacturer (where applicable) in the individual Classifications. The material and attributes are critical to the performance of the system and the ability of such system to satisfy the conditions of acceptance in ANSI/UL 1479 and the local building code. The fire-resistance rating of the system is dependent upon the use and installation of the materials specified within the respective system.

FILL MATERIALS

When more than one fill, void or cavity material is specified under a single item number within a firestop system, it is intended that any single one of the materials may be used.

CONDUCTOR AMPACITY

Where indicated in the system, the ampacity reduction due to the firestop system has been determined in accordance with UL Subject 1712, "Outline of Investigation for Tests for Ampacity of Insulated Electrical Conductors Installed in Fire Protective Systems." If not specified in the individual system, the effect of the firestop system on the ampacity of electrical conductors has not been investigated.

NUMBERING SYSTEM

The systems are identified in this category by an alpha-numeric identification system. The alpha components identify the type of assembly being penetrated and the numeric component identifies the type of penetrating item.

The first alpha component is an F, W or C. The F signifies a floor is being penetrated, the W signifies a wall is being penetrated, and C signifies either a floor or a wall is being penetrated.

The second alpha component may be any letter. The significance of the letter used is:

Letter	Description
A	Concrete floors with a minimum thickness less than or equal to 5 in.
B	Concrete floors with a minimum thickness greater than 5 in.
C	Framed floors
D	Steel decks in marine vessels
E	Floor-ceiling assemblies consisting of concrete with membrane protection
F through I	Not used at present time
J	Concrete or masonry walls with a minimum thickness less than or equal to 8 in.
K	Concrete or masonry walls with a minimum thickness greater than 8 in.
L	Framed walls
M	Bulkheads in marine vessels
N	Composite panel walls
O through Z	Not used at present time

The numeric component uses sequential numbers to identify the penetrating item. The significance of the number used is:

No. Range	Description
0000-0999	No penetrating items
1000-1999	Metallic pipe, conduit or tubing
2000-2999	Nonmetallic pipe, conduit or tubing
3000-3999	Electrical cable
4000-4999	Cable trays with electrical cable
5000-5999	Insulated pipe
6000-6999	Miscellaneous electrical penetrants, such as busducts
7000-7999	Miscellaneous mechanical penetrants, such as air ducts

THROUGH-PENETRATION FIRESTOP SYSTEMS (XHEZ)

No. Range	Description
8000-8999	Groupings of penetrations, including any combination of items listed above
9000-9999	Not used at present time

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1479 (ASTM E814 [2002]), "Fire Tests of Through-Penetration Firestops."

Where indicated in the individual Classifications under Joint Systems (XHBN) and Fill, Void or Cavity Materials (XHHW), fill, void or cavity materials have also been investigated to ASTM C1241 (2000), "Standard Test Method for Volume Shrinkage of Latex Sealants During Cure."

UL MARK

Those materials identified by an (*) in the system description text are eligible to be produced under the Follow-Up Service Program of UL. The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FILL, VOID OR CAVITY MATERIALS (XHHW)

USE AND INSTALLATION

This category covers fill, void or cavity materials, which are proprietary materials investigated for use in joint systems, perimeter fire-containment systems and firestop systems. Except as specified below, properties of the fill, void or cavity materials other than the capacity to provide a degree of fire resistance to openings provided in fire-resistive walls or floors have not been investigated.

These materials are intended for installation at a job site in accordance with the application instructions provided with the product and with the instructions specified in the individual joint system, perimeter fire-containment system or through-penetration firestop system.

The fill, void or cavity material thickness published in the fire-resistance designs is measured wet and may be susceptible to a percentage of shrinkage during the curing process. Firestop systems are investigated after the fill, void or cavity materials are fully cured. Refer to the individual certifications for the investigated percentage of shrinkage.

Authorities Having Jurisdiction should be consulted before installation. Where indicated in the individual certifications, products covered under this category have also been evaluated by ICC Evaluation Service (ICC-ES).

RELATED PRODUCTS

See Joint Systems (XHBN), Perimeter Fire-containment Systems (XHDC) and Through-penetration Firestop Systems (XHEZ).

ADDITIONAL INFORMATION

For additional information, see Fire-resistance Ratings (BXRH).

REQUIREMENTS

The basic standards used to investigate the systems in which these products are installed are ANSI/UL 1479, "Fire Tests of Through-Penetration Firestops," ANSI/UL 2079, "Tests for Fire Resistance of Building Joint Systems," and ANSI/ASTM E2307 (2004), "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus."

Where indicated in the individual certifications, fill, void or cavity materials have additionally been investigated to ANSI/ASTM E136 (2011), "Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C," and/or ASTM C1241 (2000), "Standard Test Method for Volume Shrinkage of Latex Sealants During Cure."

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

For fill, void or cavity materials investigated for use in through-penetration firestop systems:

PRODUCT CATEGORIES BY CATEGORY CODE

**FILL, VOID OR CAVITY MATERIAL
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY**

Control No.

For fill, void or cavity materials investigated for use in joint systems:

**FILL, VOID OR CAVITY MATERIAL
FOR USE IN JOINT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY**

Control No.

For fill, void or cavity materials investigated for use in perimeter fire-containment systems:

**FILL, VOID OR CAVITY MATERIAL
FOR USE IN PERIMETER FIRE CONTAINMENT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY**

Control No.

For fill, void or cavity materials investigated for use in firestop systems, joint systems and/or perimeter fire-containment systems:

**FILL, VOID OR CAVITY MATERIAL
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS AND/OR
JOINT SYSTEMS AND/OR PERIMETER FIRE CONTAINMENT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY**

Control No.

Where applicable, the following statement(s) may be added to any of the Classification Marks shown above:

**ALSO CLASSIFIED IN ACCORDANCE WITH ASTM E136
STANDARD TEST METHOD FOR BEHAVIOR OF MATERIALS
IN A VERTICAL TUBE FURNACE AT 750°C**

**ALSO CLASSIFIED IN ACCORDANCE WITH ASTM C1241
STANDARD TEST METHOD FOR VOLUME SHRINKAGE
OF LATEX SEALANTS DURING CURE**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FIRESTOP DEVICES (XHJI)

USE AND INSTALLATION

This category covers firestop devices, which are factory-built products intended to provide a degree of fire resistance to openings in fire-resistive walls or floors to accommodate penetrating items, such as electrical cable, cable trays, conduit and pipe.

Firestop devices are intended to be installed in accordance with the instructions provided with the device and the instructions specified in the individual through-penetration firestop system. Certification of these firestop devices contemplates installation within a heated and air-conditioned environment, unless stated otherwise in the individual certifications.

Properties of the firestop devices other than their capacity to provide a degree of fire resistance to openings provided in fire-resistive walls or floors have not been investigated. Some certifications include the effect the firestop device has on the ampacity rating of electrical conductors.

Authorities Having Jurisdiction should be consulted before installation.

RELATED PRODUCTS

See Fire-resistance Ratings – ANSI/UL 263 (BXUV) and Through-penetration Firestop Systems (XHEZ).

ADDITIONAL INFORMATION

For additional information, see Fire-resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate the through-penetration firestop systems in which these products are installed is ANSI/UL 1479, "Fire Tests of Through-Penetration Firestops."

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**FIRESTOP DEVICE
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY**

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

FORMING MATERIALS (XHKU)

USE AND INSTALLATION

This category covers forming materials investigated for use in firestop systems, joint systems and perimeter fire-containment systems. The forming materials are manufactured from proprietary materials, processed into the form of boards or sheets and formed into various sizes and shapes.

Properties of the forming materials other than their capacity to provide a degree of the fire resistance to openings provided in fire-resistive walls or floors have not been investigated.

These materials are used as a form and seal to prevent leakage during the installation and curing of some fill, void or cavity materials and should be installed in accordance with the instructions specified in the individual joint system, perimeter fire-containment system or through-penetration firestop system. After installation, forming materials are left in place and, together with the fill material, provide a degree of fire resistance for the opening.

Authorities Having Jurisdiction should be consulted before installation.

RELATED PRODUCTS

See Fire-resistance Ratings – ANSI/UL 263 (BXUV), Joint Systems (XHBN), Perimeter Fire-containment Systems (XHDG) and Through-penetration Firestop Systems (XHEZ).

ADDITIONAL INFORMATION

For additional information, see Fire-resistance Ratings (BXRH).

REQUIREMENTS

The basic standards used to investigate the systems in which these products are installed are ANSI/UL 1479, "Fire Tests of Through-Penetration Firestops," ANSI/UL 2079, "Tests for Fire Resistance of Building Joint Systems," and ANSI/ASTM E2307 (2004), "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus."

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

For forming materials investigated for use in through-penetration firestop systems:

**FORMING MATERIAL
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY**

Control No.

For forming materials investigated for use in joint systems:

**FORMING MATERIAL
FOR USE IN JOINT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY**

Control No.

For forming materials investigated for use in perimeter fire-containment systems:

**FORMING MATERIAL
FOR USE IN PERIMETER FIRE CONTAINMENT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY**

Control No.

For forming materials investigated for use in firestop systems, joint systems and/or perimeter fire-containment systems:

**FORMING MATERIAL
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS AND/OR
JOINT SYSTEMS AND/OR PERIMETER FIRE CONTAINMENT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY**

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

THROUGH-PENETRATING PRODUCTS (XHLY)

USE AND INSTALLATION

This category covers through-penetrating products that are proprietary products (cable, conduit, pipe and tubing) whose fire-resistive properties have been investigated for specific applications in which they pass through openings in fire-rated walls or floors, or both, within a building.

Unless otherwise specified, properties of the through-penetrating products other than their capacity to provide a degree of fire resistance to openings in fire-resistive walls or floors have not been investigated.

Authorities Having Jurisdiction should be consulted before installation.

THROUGH-PENETRATING PRODUCTS (XHLY)

RELATED PRODUCTS

For information on related products, see Fire-resistance Ratings – ANSI/UL 263 (BXUV) and Through-penetration Firestop Systems (XHEZ).

ADDITIONAL INFORMATION

For additional information, see Fire-resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate the through-penetration firestop systems in which these products are installed is ANSI/UL 1479, “Fire Tests of Through-Penetration Firestops.”

Where indicated in the individual certifications, products have also been investigated for heat and smoke release characteristics in accordance with UL 2043, “Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces.” Through-penetrating products and their accessories that have been investigated for mounting in air-handling spaces are specifically identified by markings on the product and in the individual certifications.

Where indicated in the individual certifications, products have also been investigated to determine their suitability for exposure to ultraviolet light in accordance with ANSI/UL 746C, “Polymeric Materials – Use in Electrical Equipment Evaluations.”

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

THROUGH-PENETRATING PRODUCT
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TIME-INDICATING AND -RECORDING
APPLIANCES FOR USE IN
HAZARDOUS LOCATIONS (XIAZ)

GENERAL

This category covers electric clocks and chart drives.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Clock for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TIRES, ELECTRICALLY-CONDUCTIVE
RUBBER, INDUSTRIAL, RELATING
TO HAZARDOUS LOCATIONS (XJCV)

GENERAL

This category covers solid industrial tires made of electrically conductive rubber specially developed and compounded to have an electrical conductivity adequate to readily dissipate static electricity. The conductive-rubber

TIRES, ELECTRICALLY-CONDUCTIVE RUBBER, INDUSTRIAL,
RELATING TO HAZARDOUS LOCATIONS (XJCV)

tires are vulcanized to metal rims or wheels. They are intended for use on industrial trucks that may be operated in hazardous locations where static sparks would introduce a fire and explosion hazard.

In order for static charges to pass from equipment fitted with the tires, it is necessary that the various parts of the equipment be conductive, and electrically connected together, and that the equipment be operated on an adequately conductive surface or flooring (see Flooring, Electrically Conductive, Relating to Hazardous Locations [INFZ]).

Liquid gasoline and oil are injurious to rubber compounds, and impair the electrically conductive properties of these tires. Accordingly, contact of the tires with liquid gasoline or oil, and the use of floor oils and oily sweeping compounds, should be avoided. Insulating floor waxes should not be used.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 583, “Electric-Battery-Powered Industrial Trucks,” and UL 1067, “Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electrically Conductive Rubber Industrial Tire Relating to Hazardous Locations.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TOOLS (XJXX)

TOOLS FOR USE IN HAZARDOUS
LOCATIONS (XKVL)

PORTABLE ELECTRIC TOOLS FOR USE IN
HAZARDOUS LOCATIONS (XKWH)

USE

This category covers cord-connected and battery-operated power tools intended for securing fasteners. This category does not cover tools such as drills, grinders, circular saws or other equipment that, under normal operation, may produce arcs, sparks or hot surfaces.

This category does not cover attachments such as grinding wheels, sanders, polishers or other attachments that may be offered by the manufacturer to perform operations other than intended by the design of the basic tool.

The load on certain tools varies within a wide range. Accordingly, the amp rating marked on such a tool may not be the maximum current that can be drawn by the tool under normal use conditions, but is rather an indication of the thermal capacity of the motor employed. It is indicative of the loading to which the tool may be continuously subjected without causing overheating.

The use of some tools involves certain inherent hazards related to the risk of injury that cannot be wholly eliminated by practical design features. Such hazards have been reduced to an acceptable degree in the certified tools.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standards used to investigate products in this category are ANSI/UL 60745-1, “Hand-Held Motor-Operated Electric Tools – Safety – Part 1: General Requirements,” and ANSI/UL 60745-2-2, “Hand-Held Motor-Operated Electric Tools – Safety – Part 2-2: Particular Requirements for Screwdrivers and Impact Wrenches.”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up

Portable Electric Tools for Use in Hazardous Locations (XKWH)–Continued

Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Tool for Use in Hazardous Locations," "Portable Tool for Use in Hazardous Locations" or "Portable Electric Tool for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRADESHOW EQUIPMENT (XNRI)

This category covers equipment intended for indoor use for the purpose of illuminating, animating, activating, or displaying with respect to temporary expositions, exhibits, show conventions, meetings or assemblies. These units are for temporary construction and display at exposition events and are intended to be installed and used in accordance with Article 518 of ANSI/NFPA 70, "National Electrical Code." The requirements of the Authorities Having Jurisdiction should be consulted regarding use of these devices and equipment before installation.

EXHIBITION DISPLAY UNITS, ACCESSORIES (XNRU)

USE

This category covers accessories consisting of equipment that is complete and is specifically and solely for use in the tradeshow industry as peripheral or related devices. This includes convention-center cord sets.

A convention-center cord set is one of the following types:

Parallel Type — The cord provided is a flat, jacketed, parallel conductor, extra-hard-usage type provided with an attachment plug on one end and a load fitting on the opposite end and is typically used for installation under a carpet.

Booth Stringer Type — The cord provided is a jacketed, round, extra-hard-usage type provided with an attachment plug on one end and convenience receptacle outlets along the length of the cord set to provide power for lighting and displays.

PRODUCT MARKINGS

A convention-center cord set of the Parallel type is marked "Parallel Convention Center Cable for Temporary Tradeshow Use Only" on the surface of the cord, spaced at intervals not greater than 6 ft (1.83 m) apart.

A convention-center cord set of the Booth Stringer type is marked "Booth Stringer Convention Center Cable for Temporary Tradeshow Use Only" on the surface of the cord, spaced at intervals not greater than 6 ft (1.83 m) apart.

ADDITIONAL INFORMATION

For additional information, see Tradeshow Equipment (XNRI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate convention-center cord sets are ANSI/UL 2305, "Exhibition Display Units, Fabrication and Installation," ANSI/UL 817, "Cord Sets and Power-Supply Cords," and ANSI/UL 498, "Attachment Plugs and Receptacles."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Exhibition Display Unit – Accessories."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EXHIBITION DISPLAY UNITS, CUSTOM (XNSA)

USE AND INSTALLATION

This category covers devices consisting of custom-built panels, sections or complete exhibition display units.

Custom exhibition display units are uniquely designed for display at a particular exhibition, show, meeting or assembly. The unique construction design is intended to be used for a particular product, service or organization.

Exhibition Display Units, Custom (XNSA)–Continued

Custom exhibition display units are built partially or wholly on site.

SURFACE-BURNING CHARACTERISTICS

The surface-burning characteristics of building materials employed in these assemblies is judged to be no greater than that of ordinary lumber used in on-site construction. Finished surfaces are of materials having a flame-spread rating of 200 or less and, unless otherwise marked, a smoke-developed rating of 200 or less.

ADDITIONAL INFORMATION

For additional information, see Tradeshow Equipment (XNRI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2305, "Exhibition Display Units – Fabrication and Installation."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Exhibition Display Unit – Custom."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EXHIBITION DISPLAY UNITS, PORTABLE AND MODULAR (XNSN)

USE AND INSTALLATION

This category covers portable tradeshow displays, hanging components and other exhibit assemblies that may be interconnected to form an exhibition display unit.

Portable exhibition display units are intended to be moved. They are hand carried and set up without tools and/or a ladder. They do not require trained personnel to setup.

Modular exhibition display units are systems consisting of a series of components that are tubular in design, and are mechanically connected together to form the supporting structure of an exhibition display unit or portion of a unit. A modular system uses a locking means of connection whereby the strength and integrity of the connection is maintained. Elements of these systems are intended to be used repeatedly in various configurations.

SURFACE-BURNING CHARACTERISTICS

The surface-burning characteristics of building materials employed in these assemblies are judged to be no greater than that of ordinary lumber used in on-site construction. Finished surfaces are of materials having a flame-spread rating of 200 or less and, unless otherwise marked, a smoke-developed rating of 200 or less.

ADDITIONAL INFORMATION

For additional information, see Tradeshow Equipment (XNRI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2305, "Exhibition Display Units – Fabrication and Installation."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Exhibition Display Unit."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

EXHIBITION DISPLAY UNITS, REBUILT (XNST)

GENERAL

This category covers rebuilt exhibition display units that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt exhibition display units are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt exhibition display units are subject to the same requirements as new exhibition display units.

TRADESHOW EQUIPMENT (XNRI)

Exhibition Display Units, Rebuilt (XNST)—Continued

RELATED PRODUCTS

See Exhibition Display Units, Custom (XNSA) and Exhibition Display Units, Portable and Modular (XNSN).

ADDITIONAL INFORMATION

For additional information, see Tradeshow Equipment (XNRI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2305, "Exhibition Display Units - Fabrication and Installation."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Rebuilt Exhibition Display Unit."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRAFFIC SIGNAL CABLE CLASSIFIED IN ACCORDANCE WITH IMSA SPECIFICATIONS (XNTL)

GENERAL

This category covers cable investigated in accordance with International Municipal Signal Association (IMSA) specifications. The cable is intended for installation as aerial cable or in underground conduit as part of a traffic signal system. This cable employs a color-code scheme that permits a conductor with green insulation to be used for other than grounding purposes.

This cable has not been investigated for flammability. This cable is not suitable for use as a substitute for cable or wiring systems covered in ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are one or more of the following:

- IMSA Specification 19-1 (1991), "Polyethylene Insulated, Polyvinyl Chloride Jacketed Signal Cable"
- IMSA Specification 19-2 (1991), "Paired, Polyethylene Insulated, Polyvinyl Chloride Jacketed Communication Cable with Electrical Shield"
- IMSA Specification 19-5 (1991), "Polyethylene Insulated, Polyethylene Belted, Copper Shielded, Polyvinyl Chloride Jacketed Signal Cable"
- IMSA Specification 19-6 (1991), "Paired, Polyethylene Insulated, Polyethylene Belted, Copper Shielded, Polyvinyl Chloride Jacketed Communication Cable"
- IMSA Specification 20-1 (1991), "Polyethylene Insulated, Polyethylene Jacketed Signal Cable"
- IMSA Specification 20-2 (1991), "Paired, Polyethylene Insulated, Polyethylene Jacket, Communication Cable with Electrical Shielding"
- IMSA Specification 20-5 (1991), "Polyethylene Insulated, Polyethylene Belted, Copper Shielded, Polyethylene Jacketed Signal Cable"
- IMSA Specification 20-6 (1991), "Paired, Polyethylene Insulated, Polyethylene Belted, Copper Shielded, Polyethylene Jacketed Communications Cable"
- IMSA Specification 26-2 (1991), "Neoprene Covered, Hard Drawn Copper Line Wire"
- IMSA Specification 26-3 (1991), "High Density Polyethylene Covered Hard Drawn Copper Line Wire"
- IMSA Specification 26-4 (1991), "Polyvinyl Chloride Covered Hard Drawn Copper Line Wire"
- IMSA Specification 29-1 (1991), "High Density Polyethylene Covered Hard Drawn Copper Two Conductor Parallel Line Wire"
- IMSA Specification 29-3 (1991), "High Density Polyethylene Covered, Red Polyvinyl Chloride Jacketed Hard Drawn Copper Two Conductor Parallel Line Wire"
- IMSA Specification 39-2 (1991), "Paired, Polyethylene Insulated, Polyvinyl Chloride Jacketed Communication Cable with Electrical Shielding"
- IMSA Specification 39-6 (1991), "Paired, Polyethylene Insulated, Polyethylene Belted, Polyvinyl Chloride Jacketed Communication Cable with Electrical Shielding"

TRAFFIC SIGNAL CABLE CLASSIFIED IN ACCORDANCE WITH
IMSA SPECIFICATIONS (XNTL)

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IMSA Specification 40-2 (1991), "Polyethylene Insulated, Polyethylene Belted, Polyethylene Jacketed Communication Cable with Electrical Shielding"

IMSA Specification 40-6 (1991), "Paired, Polyethylene Insulated, Polyethylene Belted, Polyethylene Jacketed Communication Cable with Electrical Shielding"

IMSA Specification 50-2 (1991), "Polyethylene Insulated, Polyethylene Jacketed, Loop Detector Lead-In Cable"

IMSA Specification 51-1 (1991), "Polyvinyl Chloride Insulated, Nylon Jacketed Loop Detector Wire"

IMSA Specification 51-3 (1991), "Cross Linked Polyethylene Insulated Loop Detector Wire"

IMSA Specification 51-5 (1997), "Polyvinyl Chloride Insulated, Nylon Jacketed, Loosely Encased in a Polyvinyl Chloride or a Polyethylene Tube Loop Detector Wire"

UL MARK

The Classification Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products is as illustrated below:

TRAFFIC SIGNAL CABLE

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.®
IN ACCORDANCE WITH IMSA SPECIFICATIONS XX-X

No.

In addition, the Classification Mark may include the UL symbol (as illustrated in the Introduction of this Directory).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRAILING CABLE CLASSIFIED IN ACCORDANCE WITH DIN PUBLICATION DIN VDE 0250 PART 813 (XNUA)

GENERAL

This category covers trailing cable intended to provide power to the boom on shipyard container cranes. The cable consists of insulated conductors, ground conductors and ground check conductors twisted together with an overall jacket. The conductor stranding is intended to be in accordance with Class 5 DIN VDE 0295-1992, "Conductors of Cables, Wires and Flexible Cords for Power Installation." The cable is rated 0.6/1 kV to 20/35 kV.

This cable has not been investigated for use in accordance with ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

Trailing cable is marked with the cable construction code followed by the manufacturer's name or other identification and year of manufacture. The cable construction code consists of:

NTM@WOU-# % \$ — trailing cable with one rubber sheath, or

NTS@WOU-# % \$ — trailing cable with two rubber sheaths,

where @ is any number of the abbreviations below that designate the structural elements contained in the cable. The abbreviations are ordered as they appear from the inside to the outside of the cable:

K — rubber cross in the core of the cable

C — conductive metal casing over the stranded cores or between the inner and outer sheath

CG — conductive nonmetallic casing over the stranded cores or between the inner and outer sheath

CE — conductive metal casing over the insulation of the outer conductors

CGE — conductive nonmetallic casing over the insulation of the outer conductors

R — round wire armoring

RL — armoring consisting of round litz wire

/3 — protective conductor uniformly distributed in the interstices

/3E — protective conductor uniformly distributed over the insulation of the outer conductor

KON — concentric protective conductor between the inner and outer sheath

ST — control cores within the cable

FM — telecommunication lines within the cable

OL — monitoring conductor within the cable,

where # is "J" for a core with a green/yellow marking and "O" is a core without a green/yellow marking.

464 TRAILING CABLE CLASSIFIED IN ACCORDANCE WITH DIN PUBLICATION DIN VDE 0250 PART 813 (XNUA)

where % is the number and size of the conductors, and where \$ is the rated voltage.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is DIN Publication DIN VDE 0250 Part 813-1985, "Insulated Power Cables – Trailing Cable."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

TRAILING CABLE

CLASSIFIED IN ACCORDANCE WITH DIN PUBLICATION DIN VDE 0250 PART 813 No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFER SWITCHES FOR USE IN FIRE PUMP MOTOR CIRCUITS (XNVE)

GENERAL

This category covers separately mounted, open and enclosed automatic transfer switches intended for use in fire pump motor circuits, including associated control devices, with a maximum rating of 600 V ac.

These transfer switches are intended for use in fire pump motor circuits covered by ANSI/NFPA 20, "Installation of Stationary Pumps for Fire Protection," and Article 695 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Fire pump power transfer switches are automatic transfer switches that transfer a fire pump motor load from a normal supply to an alternate (on-site generated or second utility) supply in the event of failure of the normal supply, and automatically return the load to the normal supply when the normal supply is reestablished. No other loads, other than the fire pump motor, are intended to be connected to the fire pump power transfer switch.

If not marked to indicate that the alternate source is a second utility, the alternate source is considered to be an on-site generated supply. Such transfer switches include frequency sensing and sensing of at least one phase of the alternate (generator-set) source to enable transfer to the alternate source. Such transfer switches have a switching contact(s) to initiate the starting of an engine generator set. Such transfer switches may include a disconnect switch or an isolating switch for the alternate source (generator set). If it does, this transfer switch is equipped with pilot contacts for supervision and pilot contacts to override the engine start signal.

Additional sensing devices that may initiate or delay transfer have been investigated in accordance with the manufacturer's marked operating values.

The enclosure of an enclosed transfer switch has been investigated for its ability to protect against water dripping on the enclosure from the downward vertical.

Transfer switches investigated for their suitability for use as service equipment are marked "SUITABLE FOR USE AS SERVICE EQUIPMENT."

Transfer switches are required to be designed so that the load cannot remain simultaneously disconnected for both the normal and alternative sources when either or both sources are available, except that transfer switches marked "SUITABLE FOR USE AS SERVICE EQUIPMENT" are provided with accessible means to independently disconnect both the normal and alternate sources. Alarm pilot contacts are provided to supervise the position of these disconnects.

These transfer switches are marked with a short-circuit rating and are intended for connection to circuits in which the available fault current does not exceed the marked short-circuit rating.

These transfer switches may be marked to indicate that protection is intended to be provided by fuses or by an inverse time circuit breaker. If there is no marking of a protective device type, transfer switches are considered suitably protected by either type of device. Transfer switches may be marked with a maximum rating of protective device. If not marked with a rating, the transfer switches are considered suitably protected by a protective device of the maximum rating required by Article 695 of the NEC.

Transfer switches have been investigated for load switching and inrush capability and for a number of cycles of operation based on their intended use which includes scheduled test operations switching full load.

RELATED PRODUCTS

TRANSFER SWITCHES FOR USE IN FIRE PUMP MOTOR CIRCUITS (XNVE)

Fire pump controller assemblies with a transfer switch are covered under Pump Controllers, Fire (QYZS).

ADDITIONAL INFORMATION

For additional information, see Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1008, "Transfer Switch Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fire Pump Power Transfer Switch."

The Listing Mark is applied to the switch panel on transfer switches investigated without regard to the enclosure in which they are mounted. When the Listing Mark is applied to the enclosure of an enclosed transfer switch, it indicates the Listing of the complete enclosed assembly.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFORMERS (XNWX) ENERGY-MONITORING CURRENT TRANSFORMERS (XOBA)

GENERAL

This category covers open-type current transformers intended for field installation within distribution and control equipment such as panelboards, switchboards, industrial control equipment, and energy-monitoring/management equipment, to measure current on a branch circuit. These transformers are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

These open-type current transformers are rated for use in either 250 V ac or 600 V ac line-to-line circuits.

Current-transformer-conductor leads are considered Class 1 circuits, as defined by the NEC, and are intended to be installed in accordance with NEC Chapter 3 wiring methods. Isolation for the user is intended to be provided at the termination.

INSTALLATION INSTRUCTIONS

The installation instructions may include the following:

- Intended use of the equipment
- Electrical ratings:
 - Primary voltage, either 250 V or 600 V
 - Frequency(ies)
 - Primary current rating
 - Secondary voltage rating
- Model designation
- Name and address of manufacturer or supplier from whom technical assistance may be obtained
- Maximum ambient rating, if investigated for greater than 40°C
- Maximum intended elevation, if investigated for more than 2000 m
- Instructions for the installation and removal of the current transformer, which include the following statements:
 - Always open or disconnect circuit from power-distribution system (or service) of building before installing or servicing current transformers.
 - The current transformers may not be installed in equipment where they exceed 75 percent of the wiring space of any cross-sectional area within the equipment.
 - Restrict installation of current transformer in an area where it would block ventilation openings.
 - Restrict installation of current transformer in area of breaker arc venting.
 - "Not suitable for Class 2 wiring methods" and "Not intended for connection to Class 2 equipment."
 - Secure current transformer and route conductors so that they do not directly contact live terminals or bus.
 - The word "WARNING" and the following (or equivalent) statement: "To reduce the risk of electric shock, always open or disconnect circuit from power-distribution system (or service) of building before installing or servicing current transformers."

PRODUCT MARKINGS

Current transformers investigated for use in a service-entrance location may be marked "Service Entrance."

Current transformers marked "Service Entrance" may additionally be marked "Overvoltage Category IV" (or "CAT IV"). Non-service-entrance types may be marked "Overvoltage Category III" (or "CAT III").

Energy-monitoring Current Transformers (XOBA)–Continued

Current transformers investigated for installation in an environment where only nonconductive pollution occurs are marked “Controlled Environment” or “Pollution Degree 2.”

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL 2808, “Outline of Investigation for Energy Monitoring Current Transformers.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Energy-monitoring Current Transformer” (or “Energy-monitoring CT”). The word “Transformer” may be abbreviated “XFMR,” “XFRMR” or “XFORMER.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFORMERS, CLASS 2 AND CLASS 3 (XOKV)

GENERAL

This category covers transformers with secondary voltage limits of 30 V rms for Class 2 and 150 V rms for Class 3 in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC), and intended for connection to essentially sinusoidal supply sources.

These transformers are intended for use in Class 2 or Class 3 remote control and signal circuits in accordance with Article 725 of the NEC.

A Class 2 or Class 3 transformer that is inherently limited has an impedance within the transformer that limits the current output to a particular maximum value. It may or may not be provided with a thermostat or other temperature-sensitive device to limit its maximum temperature.

A Class 2 or Class 3 transformer that is not inherently limited does not have an impedance to limit the maximum current output to a specified value. The maximum power is limited by an overcurrent-protective device.

A Class 2 or Class 3 transformer that includes a separate current-limiting impedance, such as a resistor or positive temperature coefficient device (PTC), is covered by these requirements.

PRODUCT MARKINGS

A Class 2 or Class 3 transformer is marked “Class 2” or “Class 3,” respectively.

Class 2 transformers with open circuit secondary voltages in excess of 15 V rms or 21.2 V peak but not in excess of 30 V rms or 42.4 V peak, are marked “Class 2 Not Wet, Class 3 Wet,” to indicate that wet contact is likely. Class 3 wiring methods are intended to be used, in accordance with Article 725 of the NEC.

These transformers are legibly and permanently marked with the manufacturer’s name, trade name or trademark; the date or other dating period of manufacture not exceeding any three consecutive months; a distinctive catalog number or the equivalent; and the electrical rating.

The electrical rating includes:

- The primary voltage
- Frequency
- The voltage and volt-ampere or amperes for each secondary winding

Transformers provided with an insulation system investigated to ANSI/UL 1446, “Systems of Insulating Materials – General,” or intended for use in the United States, are marked “ISC-x-US,” where:

- “ISC” stands for “Insulation System Class”
- “x” is replaced with the rating of the insulation system (e.g., Class 130 (B) insulation)
- “US” represents the country in which the transformer is intended to be used

Transformers provided with an insulation system investigated to ANSI/UL 1446 and CAN/CSA-C22.2 No. 0, “General Requirements – Canadian Electrical Code, Part II,” or intended for use in the United States and Canada, are marked “ISC-x,” where:

- “ISC” stands for “Insulation System Class”
- “x” is replaced with the rating of the insulation system (e.g., Class 130 (B) insulation)

Transformers are marked to indicate which terminals or leads are for primary and which are for secondary windings. Secondary winding connections are identified one from another.

Transformers, Class 2 and Class 3 (XOKV)–Continued

A transformer with multiple secondary windings having an output exceeding 21.2 or 42.4 V peak is marked, where readily visible after installation, with the word “WARNING,” and the following or equivalent: “Risk of electric shock or fire. Do not interconnect secondary windings.”

A transformer is marked to indicate the proper replacement part and procedure for a required replaceable protective device.

A transformer rated less than 110 V and not intended for use on a 110-120 V circuit is marked “For use only on (intended voltage) circuits.”

Where higher temperature-rated field wiring is required, the transformer is marked “Use wire rated for at least [75 or 90]C.”

Transformers intended for installation with open wiring or concealed knob and tube wiring in accordance with Articles 320 and 324 of the NEC, are marked “Suitable for use in accordance with Articles 320 and 324 of the NEC.”

Transformers intended for mounting in a conduit knockout and that have no means for maintaining a bonding path between the transformer and the equipment grounding conductor when the transformer is installed in a nonmetallic box are marked “Install in Metal Box Only.”

RELATED PRODUCTS

Direct-plug-in Class 2 transformers are covered under Direct-plug-in and Cord-connected Class 2 Power Units (EPBU).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 5085-1, “Low Voltage Transformers – Part 1: General Requirements,” and ANSI/UL 5085-3, “Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Class 2 Transformer,” “Class 2 Not Wet, Class 3 Wet Transformer” or “Class 3 Transformer.” The word “Transformer” may be abbreviated “XFMR,” “XFRMR” or “XFORMER.”

The Listing Mark for this category requires the use of a holographic label.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFORMERS, DIMMER (XOYT)

GENERAL

This category covers dimmer-type, air-cooled, variable-voltage autotransformers and reactors, intended for dimming portable electric lamps and electric lighting fixtures used in nonindustrial branch-lighting circuits of not more than 120 V, and having overcurrent protection of not more than 20 A. They are furnished in enclosures having means for conduit connection and may be provided with a control switch.

RELATED PRODUCTS

Industrial-type dimmers are covered under Power Circuit and Motor-mounted Apparatus (NMTR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 506, “Specialty Transformers,” and ANSI/UL 508, “Industrial Control Equipment.”

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Dimmer Transformer,” “Tungsten Lamp Dimmer” or “Fluorescent Lamp Dimmer,” or other appropriate product name. The word “Transformer” may be abbreviated “XFMR,” “XFRMR” or “XFORMER.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Transformers, Dimmer (XOYT)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFORMERS, DISTRIBUTION, DRY TYPE, OVER 600 VOLTS (XPFS)

USE AND INSTALLATION

This category covers dry-type distribution transformers, including solid-cast and resin-encapsulated transformers rated 69 kV class or less, single- and three-phase.

This category also covers series-connected, dry-type, air-core, single-phase and three-phase outdoor and indoor reactors rated 69 kV class or less. Dry-type, air-core reactors are self-cooled by natural air convection.

Both the primary and secondary voltage ratings may be greater than 600 V. The transformers may be provided with surge arresters.

Transformers provided with forced-air (fan-cooled) ratings are provided with alarm contacts for remote indication of overtemperature.

These transformers are intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

Transformers having exposed live parts, such as at high-voltage bushings, are intended for installation in places accessible only to qualified persons, as defined in the NEC.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1562, "Transformers, Distribution, Dry-Type - Over 600 Volts," or ANSI/IEEE C57.16 (1996), "Standard Requirements, Terminology, and Test Code for Dry-Type Air-Core Series-Connected Reactors."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Distribution Transformer." The word "Transformer" may be abbreviated "XFMR," "XFRMR" or "XFORMER."

The "Distribution Transformer" Listing Mark covers both the transformer and the enclosure.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFORMERS, DISTRIBUTION, LIQUID-FILLED TYPE, OVER 600 VOLTS (XPLH)

USE AND INSTALLATION

This category covers liquid-filled, distribution type, pad-mounted and substation-type transformers, rated 69 kV class or less, single- and three-phase.

The voltages in the highest voltage winding are greater than 600 V. The transformers may be provided with surge arresters.

Transformers provided with forced-air (fan-cooled) ratings are provided with alarm contacts for remote indication of overtemperature.

These transformers are intended for installation in accordance with the requirements of ANSI/NFPA 70, "National Electrical Code" (NEC).

Transformers having exposed live parts, such as at high-voltage bushings, are intended for installation in places accessible only to qualified persons, as defined in the NEC.

The type of liquid used is identified on the transformer nameplate. Additional information on the fluid used is provided in Material Safety Data Sheets (MSDS) available from the transformer manufacturer.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/IEEE C57.12.00 (2010), "Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers."

In addition to ANSI/IEEE C57.12.00 (2010), the following standards are also used to investigate pad-mounted types:

ANSI/IEEE C57.12.22 (1993), "Transformers - Pad-Mounted, Compartmental-Type, Self-Cooled Three-Phase Distribution Transformers with High-Voltage Bushings, 2500 kVA and Smaller: High Voltage, 34,500 Grd Y/19,920 Volts and Below; Low-Voltage, 480 Volts and Below"

Transformers, Distribution, Liquid-filled Type, Over 600 Volts (XPLH)—Continued

ANSI/IEEE C57.12.26 (1992), "Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for Use with Separable Insulated High-Voltage Connectors (34,500 Grd Y/19,920 V and Below; 2500 kVA and Smaller)"

ANSI/IEEE C57.12.28 (2005), "Pad-Mounted Equipment - Enclosure Integrity"

ADJUNCT SERVICE

UL provides a service for the Classification of liquid-filled, distribution type, pad-mounted and substation-type transformers, rated 69 kV class or less, single- and three-phase, that not only meet the appropriate requirements of UL but also have been investigated in accordance with Section 450.23 of the NEC.

These transformers are provided with a UL Classified "Less-Flammable Liquid" that has a fire point not less than 300°C, and are marked to identify the product name and flammability rating of the liquid that is provided, whether the liquid may evolve flammable gases when decomposed by an electric arc (as applicable), and with all use restrictions provided for in the Classification of the liquid. See Transformer Fluids (EOVK) and Dielectric Mediums (EOUV) for additional information. Use restrictions may include information such as limits on the overcurrent protection to be used in the transformer primary.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Liquid-filled Distribution Transformer." The word "Transformer" may be abbreviated "XFMR," "XFRMR" or "XFORMER."

The "Liquid-filled Distribution Transformer" Listing Mark covers both the transformer and the enclosure.

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with Section 450.23 of the NEC. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following marking:

ALSO CLASSIFIED FOR USE AS LESS-FLAMMABLE LIQUID-INSULATED TRANSFORMER IN ACCORDANCE WITH SEC. 450-23 OF THE NATIONAL ELECTRICAL CODE (NEC)

AND MARKED USE RESTRICTIONS ON THE TRANSFORMER

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFORMERS, GENERAL PURPOSE (XPTQ)

USE

This category covers transformers of the compound filled, exposed core or open core, coil construction, general purpose and industrial control types, rated 600 V or less. Step-up, step-down, insulated and autotransformer types, as well as air-cooled reactors, are also included.

Open core and coil power transformers for use in industrial control equipment are identified as "Industrial Control Transformers."

These transformers have been investigated for use on sinusoidal supply circuits only. They have not been investigated for use where a significant nonsinusoidal content is present, such as that which may occur with uninterruptible power supplies, data processing equipment and solid-state motor speed controllers.

General purpose transformers are suitable for use in a maximum 25°C ambient unless otherwise marked. Industrial control transformers are suitable for use in a 40°C ambient.

A transformer intended for elevated voltage use is marked to indicate that one or more windings may be operated at an elevated voltage, in either an isolated or autotransformer mode, as appropriate. Such marking includes the limit of the elevated voltage, the current (amp) limits, and references as to where further connection detail may be found. Such further detail includes typical connection diagrams and methods of relating winding current to total load kVA. Elevated voltage is that situation in which a voltage between a winding (including its subordinate parts such as terminals) and other conductive parts of the transformer exceeds the voltage of the winding.

Some transformers are marked to specify a minimum distance to a wall.

General purpose transformers are provided with leads, or with studs or terminal pads to which certified pressure wire connectors can be factory or

Transformers, General Purpose (XPTQ)—Continued

field installed to accommodate field wiring. Wire-binding screws or studs with cupped washers may be used for copper wire 10 AWG max.

Unless the equipment is marked otherwise, termination provisions are based on the use of 60°C wire for sizes 14-1 AWG, and 75°C wire for sizes 1/0 AWG and larger.

In cases where the nature of the construction of the transformer is such that special precautions beyond the requirements of ANSI/NFPA 70, "National Electrical Code," must be observed in installations or use, suitable special instructions are marked on the transformer.

PRODUCT MARKINGS

All transformers are marked with the following:

- The primary voltage (or voltages) and frequency
- Number of phases
- All secondary voltages
- The secondary capacity in amperes or volt-amperes

Transformers provided with an insulation system investigated to ANSI/UL 1446, "Systems of Insulating Materials – General," or intended for use in the United States, are marked "ISC-x-US," where:

"ISC" stands for "Insulation System Class"

"x" is replaced with the rating of the insulation system (e.g., Class 130 (B) insulation)

"US" represents the country in which the transformer is intended to be used

Transformers provided with an insulation system investigated to ANSI/UL 1446 and CAN/CSA-C22.2 No. 0, "General Requirements – Canadian Electrical Code, Part II," or intended for use in the United States and Canada, are marked "ISC-x," where:

"ISC" stands for "Insulation System Class"

"x" is replaced with the rating of the insulation system (e.g., Class 130 (B) insulation)

Autotransformers are marked "AUTOTRANSFORMER."

Distribution-system transformers are provided with a wiring diagram.

Transformers weighing more than 100 lbs (45 kg) are marked with their weight in pounds (kg).

Transformers rated 25 kVA or more are marked with the percent impedance.

Transformers are marked with the environmental enclosure Type number (Type 1, Type 2, Type 3R or Type 3RX).

RELATED PRODUCTS

Transformers of the air-cooled, dry, ventilated and nonventilated types are covered under Power and General Purpose Transformers, Dry Type (XQNX).

Reactors used for dimming, and variable voltage autotransformers are covered under Power Circuit and Motor-mounted Apparatus (NMTR) or, for nonindustrial types, Transformers, Dimmers (XOYT).

Voltage regulators are covered under Power Supplies, General Purpose (QQFU).

Swimming pool transformers are covered under Swimming Pool and Spa Transformers (WDGV).

Ballasts for mercury lamps and fluorescent lamps are covered under High-intensity-discharge Lamp Ballasts (FLCR) and Fluorescent Lamp Ballasts (FKVS), respectively.

Ignition transformers are covered under Transformers, Ignition (XPZZ).

Liquid-filled transformers are covered under Transformers, Distribution, Liquid-filled Type, Over 600 V (XPLH).

Class 2 and 3 transformers are covered under Transformers, Class 2 and Class 3 (XOKV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 506, "Specialty Transformers," or ANSI/UL 5085-1, "Low Voltage Transformers – Part 1: General Requirements," and ANSI/UL 5085-2, "Low Voltage Transformers – Part 2: General Purpose Transformers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "General Purpose Transformer," "Industrial Control Transformer," "Air Cooled Reactor," "Auto-Transformer," or other appropriate product name as shown in the individual Listings. The word "Transformer" may be abbreviated "XFMR," "XFRMR" or "XFORMER."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Transformers, General Purpose (XPTQ)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFORMERS, IGNITION (XPZZ)**USE**

This category covers ignition transformers designed for use on gas- or oil-burning equipment where the acceptability of the combination has been determined by UL. The transformers are designed for connection to supply circuits operating at not over 600 V and, unless otherwise indicated in the individual certifications, are of the air-cooled, step-up type.

Interchangeable transformers certified as Class 6, 10, 12 or 14 have been investigated to determine that their ignition characteristics are such that they may be interchanged with other certified transformers of like class and secondary grounding on certified oil or gas burners employing single spark gaps without further ignition performance tests.

Noninterchangeable transformers are intended for specific applications or include ignition characteristics that preclude their interchangeability. Noninterchangeable transformers are acceptable only on specific gas- or oil-burning equipment with which they are tested.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 506, "Specialty Transformers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Interchangeable Ignition Transformer" or "Noninterchangeable Ignition Transformer." The word "Transformer" may be abbreviated "XFMR," "XFRMR" or "XFORMER."

A green background identifies the Listing Mark for interchangeable transformers; a red background identifies the Listing Mark for noninterchangeable transformers.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

POWER AND GENERAL-PURPOSE TRANSFORMERS, DRY TYPE (XQNX)**USE AND INSTALLATION**

This category covers transformers of the air-cooled, dry, ventilated and nonventilated types rated 600 V or less. Step-up, step-down, insulated, and autotransformer types, as well as air-cooled reactors, are also included.

The transformers and reactors are provided with leads, or with studs or terminal pads to which certified pressure-wire connectors can be factory or field installed to accommodate field wiring. The adequacy of the wire-bending space, in accordance with Article 312 of ANSI/NFPA 70, "National Electrical Code" (NEC), has not been determined and should be investigated at the time of installation.

Unless the equipment is marked otherwise, termination provisions are based on the use of 60°C wire for sizes 14-1 AWG and 75°C wire for sizes 1/0 AWG and larger.

Unless otherwise marked, these transformers have not been investigated for use where a significant nonsinusoidal current is present. Examples of equipment that may draw nonsinusoidal currents are uninterruptible power supplies, electronic ballasts, data processing equipment and solid-state motor speed controllers.

K factor-rated transformers have not been investigated for use with harmonic loads where the rms current of any single harmonic higher than the tenth is greater than 1/h of the fundamental rms current.

The transformer ratings are based on installation in a maximum 40°C ambient unless otherwise marked.

Transformers with ventilating openings should be installed so that the ventilating openings are not blocked. Some transformers are marked to specify a minimum distance to a wall.

The suitability of the transformer circuit grounding, grounding electrode connections, and equipment grounding connections in accordance with Article 250 of the NEC should be determined by the Authority Having Jurisdiction at the time of installation.

Power and General-purpose Transformers, Dry Type (XQNX)—Continued

In cases where the nature or construction of the transformer is such that special precautions beyond the requirements of the NEC must be observed in installations or use, suitable special instructions are marked on the transformer.

PRODUCT MARKINGS

All transformers are marked with the following:

1. A distinctive catalog or model number (or the equivalent)
2. The electrical ratings, which include the following:
 - a) Number of phases
 - b) Frequency(ies) in Hz
 - c) Primary voltage(s)
 - d) Secondary voltage(s)
 - e) Tap voltage(s)
 - f) kVA rating(s)
 - g) Secondary capacity in amperes and the elevated voltage limit (maximum voltage to ground) of the winding (for a transformer rated for elevated use)
3. The temperature class for the insulation system used
4. Their weight in pounds (kg)

Transformers investigated for use where significant nonsinusoidal current is present are marked "Suitable for nonsinusoidal current load with K factor not to exceed ____," where the blank is filled in with one of the standard K factor ratings of 4, 9, 13, 20, 30, 40 or 50. (The K factor specified is the summation of the per unit rms current at harmonic "h" squared times the harmonic order squared.)

If transformers are provided with a temperature sensor, the transformers are marked with the electrical rating of the temperature sensor.

Autotransformers are marked "AUTOTRANSFORMER."

Transformers rated 25 kVA or more are marked with the percent impedance.

Transformers provided with an enclosure are marked with the environmental type number(s).

RELATED PRODUCTS

Reactors used for dimming, and variable-voltage autotransformers are covered under Power Circuit and Motor-mounted Apparatus (NMTR) or, for nonindustrial types, Transformers, Dimmers (XOYT).

Voltage regulators are covered under Power Supplies, General Purpose (QQFU).

Swimming pool transformers are covered under Swimming Pool and Spa Transformers (WDGV).

Ballasts for mercury lamps and fluorescent lamps are covered under High-intensity-discharge Lamp Ballasts (FLCR) and Fluorescent Lamp Ballasts (FKVS), respectively.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1561, "Dry-Type General Purpose and Power Transformers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Transformer," "Air-Cooled Power Transformer" or "Dry Type General Purpose and Power Transformer," or other appropriate product name as shown in the individual Listings. The word "Transformer" may be abbreviated "XFMR," "XFRMR" or "XFORMER."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFORMERS, TOY (XRBV)

GENERAL

This category covers direct-plug-in or cord-connected portable, step-down transformers of the low-secondary-voltage type suitable for supplying current to electrically operated toys or hobby sets.

ACCESSORIES

An accessory to a certified toy or hobby transformer is provided with suitable markings and/or instructions detailing proper installation or assembly of the accessory with either a specific or generic certified toy or hobby transformer specified in the markings or instructions. Such accessories serve to provide conditioning or control of the transformer output voltage, current or power.

ADDITIONAL INFORMATION

Transformers, Toy (XRBV)—Continued

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 697, "Toy Transformers".

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Toy Transformer," "Hobby Transformer," "Toy Transformer Accessory" or "Hobby Transformer Accessory."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFORMERS FOR USE IN HAZARDOUS LOCATIONS (XPAF)

TRANSFORMERS, GENERAL PURPOSE FOR USE IN HAZARDOUS LOCATIONS (XPJF)

GENERAL

This category covers transformers of the compound filled, exposed core or open core and coil construction (industrial control type) type, rated 600 V or less. Step-up, step-down, insulated, and autotransformer types, as well as air-cooled reactors, are also included. Autotransformers are so marked.

These transformers have been investigated for use on sinusoidal supply circuits only. They have not been investigated for use where a significant nonsinusoidal content is present such as that which may occur with uninterruptible power supplies, data processing equipment and solid-state motor-speed controllers.

General-purpose transformers are provided with leads, or with studs or terminal pads to which certified pressure-wire connectors can be factory or field installed to accommodate field wiring. Wire-binding screws or studs with cupped washers may be used for copper wire 10 AWG max.

PRODUCT MARKINGS

A transformer intended for elevated voltage use is marked to indicate that one or more windings may be operated at an elevated voltage, in either an isolated or autotransformer mode, as appropriate. Such marking includes the limit of the elevated voltage, the current (amp) limits, and references as to where further connection detail may be found. Such further detail includes typical connection diagrams and methods of relating winding current to total load kVA. Elevated voltage is that situation in which a voltage between a winding (including its subordinate parts such as terminals) and other conductive parts of the transformer exceeds the voltage of the winding.

Some transformers are marked to specify a minimum distance to a wall. Unless the equipment is marked otherwise, termination provisions are based on the use of 60°C wire for size 14–1 AWG, and 75°C wire for size 1/0 AWG and larger.

In cases where the nature of the construction of the transformer is such that special precautions beyond the requirements of ANSI/NFPA 70, "National Electrical Code," must be observed in installations or use, suitable special instructions are marked on the transformer.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standards used to investigate products in this category are ANSI/UL 506, "Specialty Transformers," ANSI/UL 1012, "Power Units Other Than Class 2," and ANSI/UL 1561, "Dry-Type General Purpose and Power Transformers."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "General Purpose Transformer for Use in Hazardous Locations," "Industrial

TRANSFORMERS FOR USE IN HAZARDOUS LOCATIONS (XPAF)

Transformers, General Purpose for Use in Hazardous Locations (XPJF)–Continued

Control Transformer for Use in Hazardous Locations,” “Air Cooled Reactor for Use in Hazardous Locations,” “Auto-Transformer for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings. The word “Transformer” may be abbreviated “XFMR,” “XFRMR” or “XFORMER.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRANSFORMERS, DISTRIBUTION, LIQUID-FILLED TYPE, OVER 600 VOLTS FOR USE IN HAZARDOUS LOCATIONS (XPLP)

USE

This category covers liquid-filled, distribution type, pad-mounted and substation type transformers, 69 kV class or less, single- and three-phase. Both the primary and secondary voltage ratings may be greater than 600 V. The transformers may be provided with surge arresters.

The transformers may be provided with fan-cooling accessories. The use of a fan-cooling accessory permits the transformer to experience temporary overloads without exceeding the maximum temperature rating of the transformer insulation system. Transformers equipped with a fan-cooling accessory are marked to indicate that they must be connected to an attended annunciator device and that provision must be made for automatic load shedding in the event of overtemperature.

The type of liquid used is identified on the transformer nameplate. Additional information on the fluid used is provided in Material Safety Data Sheets (MSDS Sheets) available from the transformer manufacturer.

These transformers are intended for installation in accordance with the requirements of ANSI/NFPA 70, “National Electrical Code.”

RELATED PRODUCTS

Liquid-filled-type distribution transformers over 600 V investigated for use in unclassified locations are covered under Transformers, Distribution, Liquid-filled Type, Over 600 Volts (XPLH).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/IEEE C57.12.00 (2010), “Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.”

In addition to ANSI/IEEE C57.12.00 (2010), the following unclassified locations standards are also used to investigate pad-mounted types: ANSI/IEEE C57.12.22 (1993), “Transformers – Pad-Mounted, Compartmental-Type, Self-Cooled Three-Phase Distribution Transformers with High-Voltage Bushings, 2500 kVA and Smaller: High Voltage, 34,500 Grd Y/19,920 Volts and Below; Low-Voltage, 480 Volts and Below”

ANSI/IEEE C57.12.26 (1992), “Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for Use with Separable Insulated High-Voltage Connectors (34,500 Grd Y/19,920 V and Below; 2500 kVA and Smaller)”

ANSI/IEEE C57.12.28 (2005), “Pad-Mounted Equipment – Enclosure Integrity”

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Liquid-filled Distribution Transformer for Use in Hazardous Locations” (or “Liquid-filled Distribution Transformer for Use in Haz. Loc.”). The word “Transformer” may be abbreviated “XFMR,” “XFRMR” or “XFORMER.”

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SURGE-PROTECTIVE DEVICE/PANELBOARD EXTENSION MODULES CLASSIFIED FOR USE WITH SPECIFIED EQUIPMENT (XUPD)

SURGE-PROTECTIVE DEVICE/PANELBOARD EXTENSION MODULES CLASSIFIED FOR USE WITH SPECIFIED EQUIPMENT (XUPD)

GENERAL

This category covers surge-protective devices (SPDs) contained within panelboard extension enclosures. They are suitable for use with specific certified panelboards in accordance with the details described on the SPD/Panelboard extension module or as provided in the publication provided with the SPD.

SPD/Panelboard extension modules are marked, where visible after installation, “Classified for use only in specified panelboards. For catalog numbers (or equivalent) of specified panelboards, refer to Publication No. ___ provided with this SPD/Panelboard extension module. If additional information is necessary, contact [SPD/Panelboard extension module manufacturer’s name].”

The referenced publication is a compatibility list that tabulates the company name, catalog number, number of poles and electrical ratings of the SPD/Panelboard extension modules, in addition to the company name and catalog number of the applicable certified panelboards in which the SPD/Panelboard extension modules have been investigated for use. The compatibility list also details the maximum permissible voltage and maximum available short-circuit current of the supply system to the panelboard. The SPD/Panelboard extension module is not suitable for the specified application if the system supply characteristics exceed the maximum values indicated in the compatibility list. One copy of the compatibility list is provided with each SPD/Panelboard extension module.

For additional information on SPD type designations, ratings and markings, see Surge-protective Devices (VZCA) and Panelboards (QEUJ).

The following information appears in the individual Reports available from the manufacturer:

Electrical ratings, including the operating voltage rating (volts), ac power frequency (Hz) and number of phases.

Voltage Protection Rating (VPR) in volts.

Nominal Discharge Current (I_n) Rating in amps or kA.

Maximum Continuous Operating Voltage Rating (MCOV) in volts.

Short-circuit-current Rating (SCCR) in amps or kA.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 1449, “Surge Protective Devices,” and ANSI/UL 67, “Panelboards.”

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol and the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory) on the front, visible surface of the SPD/Panelboard extension module. The Classification Mark also includes the product identity “SPD/PANELBOARD EXTENSION MODULE,” together with a control number on the side of the SPD/Panelboard extension module.

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TRANSIT APPLICATION EQUIPMENT AND SYSTEMS (XUPY)

This category covers switches, controllers and other equipment intended for use in transit system applications.

POWER RECTIFIERS (XUSP)

GENERAL

This category covers power rectifiers having output voltage ratings up to 750 V dc and power ratings up to 5000 kW. These power rectifiers are intended for use in transit power systems where they are installed in areas that are protected from the elements and not accessible to unqualified personnel.

These power rectifiers are powered by transformers with low-voltage windings in configurations that allow the rectifiers to produce 6 or 12

PRODUCT CATEGORIES BY CATEGORY CODE

TRANSIT APPLICATION EQUIPMENT AND SYSTEMS
(XUPY)

470

Power Rectifiers (XUSP)—Continued

pulse outputs. The input configuration is identified on the nameplate. The configurations are defined in the standards referenced below.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI C34.2 (1968), "Practices and Requirements for Semiconductor Power Rectifiers," and NEMA RI9 (1968), "Silicon Rectifier Units for Transportation Power Supplies."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Rectifier."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SWITCHES, ISOLATING (XUTE)

USE AND INSTALLATION

This category covers single-pole switches intended to isolate sections of track as needed for maintenance or similar functions.

These switches may be open types or enclosed and may be either manually or motor operated.

Open-type switches are intended for installation in electrical enclosures in accordance with product markings and any accompanying instructions.

RATINGS

These switches are rated 6000 A and 1000 V dc maximum.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 98, "Enclosed and Dead-Front Switches," with the requirements adjusted for ratings not covered in the standard.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Transit System Isolating Switch" or "Transit System Sectionalizing Switch."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRASH COMPACTORS (XUTS)

This category covers equipment intended to reduce the volume of trash by means of mechanical compaction.

COMMERCIAL TRASH COMPACTORS (XUUC)

USE AND INSTALLATION

This category covers commercial-use compactors for reducing the volume of trash by mechanical compaction prior to disposal. They may be provided with a facility to tie the compacted trash into bales. They are intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code." These compactors are motor operated and are provided with overcurrent or overheating protective devices.

Commercial-use compactors are intended to be installed, maintained and operated by competent personnel who are fully instructed concerning the hazards involved.

Horizontal-type compactors do not include the waste container or the feed hopper. These components are provided at the time of installation and are intended to be in accordance with ANSI Z245.30 (1999), "Waste Containers - Safety Requirements," and ANSI Z245.2 (2004), "Stationary Compactors - Safety Requirements for Installation, Maintenance and Operation."

RELATED PRODUCTS

TRASH COMPACTORS (XUTS)

Commercial Trash Compactors (XUUC)—Continued

Trash compactors for household use are covered under Household Trash Compactors (XUUM).

Paper shredders for home or office use are covered under Information Technology Equipment Including Electrical Business Equipment (NWGQ). Waste disposers are covered under Waste Disposers (ZDHR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 73, "Motor-Operated Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Commercial Compactor," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HOUSEHOLD TRASH COMPACTORS (XUUM)

GENERAL

This category covers household-use compactors for reducing the volume of trash by mechanical compaction prior to disposal. These compactors are intended for installation in accordance with ANSI/NFPA 70, "National Electrical Code." These motor-operated compactors are rated 250 V or less and are provided with overcurrent or overheating protective devices.

RELATED PRODUCTS

Trash compactors for commercial use are covered under Commercial Trash Compactors (XUUC).

Paper shredders for home or office use are covered under Information Technology Equipment Including Electrical Business Equipment (NWGQ). Waste disposers are covered under Waste Disposers (ZDHR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1086, "Household Trash Compactors."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Household Trash Compactor," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRUCKS, INDUSTRIAL FOR USE IN HAZARDOUS LOCATIONS (XVHY)

Powered industrial trucks include fork trucks, tractors, motorized hand trucks, platform trucks, towing tractors and other specialized types powered by electric motors or internal combustion engines.

They have been classified with regard to specific hazards as indicated in the General Information for each of the following categories.

Except for compressed natural gas fueled industrial trucks, they are intended for use in accordance with the Standard of the National Fire Protection Association for type designations, areas of use, maintenance, and operation of Powered Industrial Trucks, NFPA 505. Compressed natural gas fueled industrial trucks are for use in designated areas where they have been judged acceptable by the Authority Having Jurisdiction.

TRUCKS, INDUSTRIAL, TYPE EX FOR USE IN HAZARDOUS LOCATIONS (XXGV)

GENERAL

This category covers electrical industrial riding or walking-type lift trucks, platform trucks, towing tractors, etc., with a storage battery as the source of power. These trucks and tractors are provided with safeguards to reduce the possibility of ignition of hazardous atmospheres by mechanical or friction sparks. Since such sparks can also be generated by the parts handled, pushed or towed by the classified equipment, suitable precautions should be taken to reduce the possibility of such sparks.

This category does not cover hauled or towed attachments or equipment that is not a part of the truck or tractor.

Certified storage batteries specified by the electric truck manufacturers are intended to be used with the trucks. The batteries are each provided with a receptacle and plug interlocked with a switch that does not permit insertion or withdrawal of the plug unless the switch is in the "off" position, or a receptacle with provision for locking the plug in the receptacle to deter removal by unauthorized persons. Normal levels of electrolytes should be maintained at all times and proper fuses used in the battery fuse enclosure.

At least two of the wheels on these trucks are electrically conductive. Liquid gasoline and oil is injurious to rubber compounds and impairs the electrically conductive properties of the tires. The use of floor oils and oily sweeping compounds should be avoided.

ADDITIONAL INFORMATION

For additional information, see Trucks, Industrial for Use in Hazardous Locations (XVHY) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 583, "Electric-Battery-Powered Industrial Trucks."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**TYPE EX INDUSTRIAL TRUCK
CLASS ___ GROUP ___ HAZARDOUS LOCATIONS ONLY
AS TO FIRE, ELECTRIC SHOCK AND EXPLOSION HAZARDS
No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

STORAGE BATTERIES, TRUCKS, ELECTRIC FOR USE IN HAZARDOUS LOCATIONS (XXIY)

GENERAL

This category covers storage batteries intended for use with Type EX industrial trucks. They are provided with explosion-proof and/or dust-ignition-proof fuse enclosure and interlock switches to prevent insertion or withdrawal of the battery cable plug under load.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 583, "Electric-Battery-Powered Industrial Trucks."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**ELECTRIC TRUCK STORAGE BATTERY
AS TO FIRE, ELECTRIC SHOCK AND EXPLOSION HAZARDS ONLY
CLASS ___ GROUP ___ HAZARDOUS LOCATIONS
Control No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Storage Batteries, Trucks, Electric for Use in Hazardous Locations (XXIY)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TRUCKS, INDUSTRIAL (XVHZ)

This category covers powered industrial trucks, which include fork trucks, tractors, motorized hand trucks, platform trucks, towing tractors and other specialized types powered by electric motors or internal combustion engines.

STORAGE BATTERIES, TRUCKS, ELECTRIC (XXHW)

USE AND INSTALLATION

This category covers Types E, EE and EO storage batteries intended for use in Types E, ES and EE industrial trucks where the installation and use is intended to be in accordance with the marking on the end product.

ADDITIONAL INFORMATION

For additional information, see Mechanical Equipment and Associated Products (AAME).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 583, "Electric-Battery-Powered Industrial Trucks."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**STORAGE BATTERY TYPE * FOR USE IN INDUSTRIAL TRUCKS AS TO FIRE AND ELECTRIC SHOCK HAZARD ONLY
Control No.**

* E, EE or EO

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

TUBING AND HOSE, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (YDGG)

USE

This category covers tubing and reinforced hose of electrically conductive plastic or natural or synthetic rubber for conveying gases or vapors in flammable anesthetizing locations where it is necessary for safety to avoid accumulation of static electricity. Unless otherwise indicated with the product, they are intended for use with air of anesthetic-air mixtures at comparatively low pressure.

Tests indicate that this tubing and hose in lengths used in flammable anesthetizing locations is sufficiently electrically conductive to equalize electrostatic charges between the electrical conductors to which they are connected.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1067, "Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electrically Conductive Hose Relating to Hazardous Locations" or "Electrically Conductive Tubing Relating to Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party.

TUNNEL-DRILLING GUIDANCE SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (YDUE)

USE AND INSTALLATION

This category covers tunnel-drilling guidance systems consisting of instruments for indication, monitoring and/or recording of level, direction and inclination of tunnel-drilling machines and the like.

Intrinsically safe systems have been investigated on the basis that all equipment connected to the system is certified as part of the system unless otherwise indicated and is used as intended.

This equipment is intended to be installed in a "controlled area" as defined by ANSI Z136.1, "Safe Use of Lasers," where access is limited to trained operator and service personnel. This equipment is intended to be provided with a marking or installation instructions which state "To Be Installed Only in a Controlled Area," or similar wording.

With regard to laser radiation hazards, the final installation site location and compliance with final installation site location requirements have not been investigated. The United States Occupational and Safety Act (OSHA) requires the final installation site facility to be in compliance with ANSI Z136.1. ANSI Z136.1 requires the final installation site facility to employ a Laser Safety Officer (LSO) adequately trained in laser safety. It is the responsibility of the LSO to ensure this equipment is installed and operating in compliance with ANSI Z136.1. However, equipment covered under this category has been determined to incorporate all provisions for final installation site location requirements, for example, a remote interlock connector is required, and, equipment covered under this category has been determined to incorporate a remote interlock connector. It is the responsibility of the final installation site LSO to ensure the remote interlock connector is connected, operational, and functioning as required.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 508, "Industrial Control Equipment."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

Laser radiation hazards — 21CFR1010, "Performance Standards for Electronic Products: General," and 21CFR1040, "Performance Standards for Light-Emitting Products," or, as an alternative, the 21CFR1010 and 21CFR1040 parts utilizing CDRH Laser Notice 50 (LN50), or, as an alternative, 21CFR1010 and 21CFR1040 with an approved variance, by the Director of the CDRH, to the International Electrotechnical Commission, IEC 60825-1, with Amendment 1 and Amendment 2, "Safety of Laser Products."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Tunnel Drilling Guidance System for Hazardous Locations."

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UNDERGROUND FEEDER AND BRANCH CIRCUIT CABLE (YDUX)

GENERAL

This category covers underground feeder and branch-circuit cable, rated 600 V, in sizes 14 to 4/0 AWG inclusive, copper, and 12 to 4/0 AWG inclusive, aluminum or copper-clad aluminum, for single and multiple conductor cables. It is designated as Type UF cable and is intended for use in accordance with Article 340 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Some multi-conductor cable is surface marked with the suffix "B" immediately following the type letters to indicate the usage of conductors employing 90°C rated insulation.

Such cable may also be installed as Nonmetallic-sheathed Cable, per Section 340.10(4) of the NEC. The ampacities of Type UF cable, with or without the suffix "B," are those of 60°C rated conductors as specified in the latest edition of the NEC.

Submersible Water Pump Cable — Indicates multi-conductor cable in which 2, 3 or 4 single-conductor Type UF cables are provided in a flat or twisted assembly. The cable is certified in sizes from 14 AWG to 4/0 AWG inclusive, copper, and from 12 AWG to 4/0 AWG inclusive, aluminum or copper-clad aluminum. The cable is tag marked "For use within the well casing for wiring deep well water pumps where the cable is not subject to repetitive handling caused by frequent servicing of the pump units." The insulation may also be surface marked "Pump Cable." The cable may be directly buried in the earth in conjunction with this use.

This cable may employ copper, aluminum, or copper-clad aluminum conductors. Cable with copper-clad aluminum conductors is surface printed "AL (CU-CLAD)" or "Cu-Clad Al." Cable with aluminum conductors is surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size wherever it appears (surface, tag, carton or reel) by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors." For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

This cable may be terminated at boxes and other enclosures by using nonmetallic-sheathed cable connectors (see Nonmetallic-sheathed Cable Connectors [PXJV]).

Cable suitable for exposure to direct rays of the sun is indicated by tag marking and marking on the surface of the cable with the designation "Sunlight Resistant."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 493, "Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Underground feeder cable that contains copper or copper-clad aluminum conductors has the product name "Underground Feeder Cable"; underground feeder cable that contains aluminum conductors has the product name "Aluminum Underground Feeder Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

UNINTERRUPTIBLE POWER-SUPPLY EQUIPMENT (YEDU)

USE AND INSTALLATION

This category covers indoor- and outdoor-use uninterruptible power-supply (UPS) equipment that may be stationary or fixed. This equipment is rated 600 V or less and is intended for use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

This category also covers large UPS equipment requiring field assembly of modules or subassemblies, which are appropriately marked as indicated below.

A UPS is used to provide alternating-current power to a load for some period of time in the event of a utility power failure. In addition, it may provide a more constant voltage and frequency supply to the load, reducing the effects of utility voltage and frequency variations.

These products include the following equipment intended for use with a UPS: (1) battery supply modules with or without batteries, (2) remote status panels, (3) bypass switches, (4) maintenance bypass switches, (5) battery circuit disconnect switches, (6) rectifier and power conversion units, and (7) power distribution panels.

The investigation of UPS equipment does not include the effects on the load that may be caused by momentary disruption of alternating-current power.

A UPS identified with an enclosure type designation or as "Rain tight" or "Rainproof" is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Products suitable for use in computer rooms in accordance with ANSI/NFPA 75, "Fire Protection of Information Technology Equipment," are marked "Suitable for Computer Room Applications," or the equivalent.

This category does not cover a UPS intended as a component of a fire-protective or burglary-protective signaling system.

REBUILT PRODUCTS

This category also covers UPS equipment that is rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt UPS equipment is rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt UPS equipment is subject to the same requirements as new UPS equipment.

RELATED PRODUCTS

UPS systems for use with professional medical and dental equipment are covered under Uninterruptible Power Supplies for Use in Health Care Facilities (KFFG).

Battery-powered emergency equipment for controlling lighting and/or power in accordance with Article 700 of the NEC is covered under Emergency Lighting and Power Equipment (FTBR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1778, "Uninterruptible Power Supply Equipment" (2nd ed.), or ANSI/UL 1778, "Uninterruptible Power Systems" (4th ed.).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Uninterruptible Power Supply" (or "UPS"), "UPS Battery Supply," "UPS Status Panel," "UPS Transfer Switch," "UPS Inverter," "UPS Rectifier/Charger," "UPS Equipment Enclosure," "UPS Equipment Part," "UPS Equipment Subassembly," "UPS Equipment Accessory," "UPS Power Distribution Panel," or other appropriate product name as shown in the individual Listings.

For rebuilt products, the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MAINTENANCE SERVICE FOR UNINTERRUPTIBLE POWER-SUPPLY SYSTEMS (YEET)

This category covers service companies Certificated as maintenance service providers for uninterruptible power-supply (UPS) equipment in the field.

Service companies that are covered in the directory have demonstrated their capability for maintaining field installed UPS equipment in accordance with the requirements established by their internal maintenance documentation.

Each UPS system covered by a Certificate is required to be maintained by the service company responsible for issuing the Certificate. A UPS system is considered to be included in this program only if it is covered by a current Certificate.

The Certificate serves as evidence that the service company (1) is covered as a Maintenance Service Company for UPS Equipment; (2) is authorized to issue the Certificate for the serviced equipment as representation that the equipment is in compliance with requirements established by their internal documentation that has been reviewed by UL; and (3) is subject to UL's field countercheck program whereby periodic inspections are made of representative serviced equipment in the field and at the maintenance service company to verify correctness of the certificated practices.

The maintenance service Certificate indicates identification and location (address) of the serviced equipment, and the service center from which it was issued. Each Certificate also bears a unique serial number and the period of time covered by the Certificate.

Periodic quality audits at the central maintenance service company's location are conducted by UL to verify that the necessary documentation and records are in place for each service location. The Certificate of UL is the only method provided by UL to identify field installed equipment under its Certificated Maintenance and Follow-Up Service.

Appearance of a company's name in the Directory does not mean that all UPS systems serviced by that company are covered under the Certifi-

Maintenance Service for Uninterruptible Power-supply Systems (YEET)—Continued

cated Maintenance Service. Only the systems for which a Certificate has been properly issued are covered under UL's Certificated Maintenance Service.

UL makes no representations or warranties, expressed or implied, that the UPS system will prevent any loss, or that the system will in all cases provide the protection for which it is installed or intended. The Certificate only evidences that UL conducts countercheck field inspections of representative serviced equipment. UL does not assume or undertake to discharge any liability of the maintenance service company or any other party. UL is not an insurer and assumes no liability for any loss which may result from failure of the equipment, incorrect certification, nonconformity with requirements, cancellation of the Certificate, or withdrawal of the company from UL's Directory prior to the expiration appearing on the Certificate. If servicing is found not in conformity with requirements, it shall be corrected or the Certificate is subject to cancellation.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

UNINTERRUPTIBLE POWER-SUPPLY EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (YEEU)

USE AND INSTALLATION

This category covers indoor- and outdoor-use uninterruptible power-supply (UPS) equipment that may be stationary or fixed. This equipment is rated 600 V or less and is intended for use in accordance with ANSI/NFPA 70, "National Electrical Code."

RELATED PRODUCTS

UPS equipment intended for use in unclassified locations is covered under Uninterruptible Power-supply Equipment (YEDU).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 1778, "Uninterruptible Power Supply Equipment" (2nd ed.), or ANSI/UL 1778, "Uninterruptible Power Systems" (4th ed.).

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Uninterruptible Power Supply for Use in Hazardous Locations," "UPS Battery Supply for Use in Hazardous Locations," "UPS Status Panel for Use in Hazardous Locations," "UPS Transfer Switch for Use in Hazardous Locations," "UPS Inverter for Use in Hazardous Locations," "UPS Rectifier/Charger for Use in Hazardous Locations," "UPS Equipment Enclosure for Use in Hazardous Locations," "UPS Equipment Part for Use in Hazardous Locations," "UPS Equipment Subassembly for Use in Hazardous Locations," "UPS Equipment Accessory for Use in Hazardous Locations" or "UPS Power Distribution Panel for Use in Hazardous Locations." The words "Hazardous Locations" may be abbreviated "Haz. Loc."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

UNIT SUBSTATIONS (YEFR)

GENERAL

This category covers unit substations rated 600 V or less intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code," and in accordance with the installation instructions provided on the unit substation.

PRODUCT CATEGORIES BY CATEGORY CODE

A unit substation consists of a transformer in combination with primary and/or secondary overcurrent protective devices or switching devices housed in a single enclosure.

Where in normal operation the load will continue for three hours or more, molded-case circuit breakers and fuses should not be loaded to exceed 80% of their current rating.

Some unit substations are suitable for use as service equipment and are so marked. Such marking is part of the Certification Mark as noted below, or is an integral part of other required markings.

Certified unit substations are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location. If all terminals are suitable for use with aluminum conductors, the marking will indicate "Use copper or aluminum wire." A unit substation employing terminals for main or branch circuit units individually marked "Cu-A1" will be marked "Use copper-Al wire" or "Use copper wire only." The latter statement indicates that wiring space or other factors make the unit substation unsuitable for aluminum conductors.

Unless the unit substation is marked with both the size and temperature rating of wire to be used, the termination provisions are based on the use of 60°C ampacities for wire sizes 14-1 AWG and 75°C ampacities for wire 1/0 AWG and larger.

Unit substations have the secondary neutral bonded to the enclosure and have provision on the neutral for connection of a grounding conductor. A terminal is also provided on the enclosure near the line terminals for use with an equipment grounding conductor between the unit substation and the enclosure of equipment on the line side of the unit substation for use when a metallic conduit system is not provided.

The suitability of unit substations for use on high capacity circuits has not been investigated.

Unit substations are marked with enclosure type number 1, 2 or 3R as described in Electrical Equipment for Use in Ordinary Locations (AALZ).

Unit substations marked with enclosure type 3RX provide the same level of protection as type 3R enclosures, and are provided with an additional level of corrosion protection for the enclosure.

A unit substation marked "Type 3R" may also be marked "Rainproof."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1062, "Unit Substations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Unit Substation."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

UNIT SUBSTATIONS OVER 600 VOLTS (YEFV)

USE AND INSTALLATION

This category covers three-phase articulated and integral unit substations for step-down operation. Articulated substations are rated through 10,000 kVA, at primary voltages of 601 V through 38 kV (nominal 35 kV). Integral substations are rated through 2500 kVA at primary voltages of 601 V through 38 kV.

Articulated unit substations consist of a transformer section(s) together with an input section(s), an output section(s), or both. Transition sections may also be provided. These unit substations are designed, coordinated and assembled as multiple self-enclosed pieces of equipment intended for connection in the field.

Integral unit substations consist of a transformer section(s) together with an input section(s), an output section(s), or both. Transition sections may also be provided. These unit substations are designed, coordinated and assembled as a single self-enclosed piece of equipment. Sections may be shipped separately.

An articulated unit substation may consist of several separately certified pieces of equipment. Only those sections provided with unit substation Certification Marks have been investigated as part of an articulated unit substation. The suitability of other assemblies will need to be determined by the Authority Having Jurisdiction.

The transformer section(s) house the three-phase power transformer(s) for step-down operation. These unit substation transformers are ventilated dry-type or cast resin type.

The input sections may consist of a terminal chamber, metal-clad switchgear, or metal-enclosed interrupter switchgear.

The output sections may consist of metal-clad switchgear, metal-enclosed interrupter switchgear, a motor control center, molded-case circuit breaker equipment, fused switch equipment, a dead-front switchboard, a panelboard or similar types of distribution or control equipment.

A transition section may be located between a transformer section and an input section, between a transformer section and an output section, between different types of input sections, or between different types of output sections. Transition sections may be integral parts of two adjacent sections, an integral part of one of the sections, or a separate section.

The transformer ratings determine the kVA and voltage capabilities of the overall integral unit substation.

These unit substations are intended for installation in accordance with the requirements of ANSI/NFPA 70, "National Electrical Code," and in accordance with the installation instructions provided on the equipment.

PRODUCT MARKINGS

A master nameplate is mounted on an external surface of the enclosure and visible after normal installation of the equipment. This master nameplate includes the following information as a minimum: manufacturer's name and equipment identification number, kVA rating or ratings if force cooled, primary and secondary lightning impulse withstand voltage (BIL) ratings, primary and secondary voltage ratings, primary and secondary continuous current ratings, transformer design impedance, and total weight. If metal-clad switchgear or metal-enclosed interrupter switchgear is connected to the transformer primary, the nameplate also includes a short-time current carrying rating and momentary current rating.

Each section of the unit substation also has its own rating based on the requirements in standards applicable for that section of the equipment. These individual section ratings are coordinated to be equal to or greater than the rating of the unit substation.

The enclosure of the integral unit substation or the several enclosures of an articulated unit substation are marked to indicate the exposure category (A, B or C) for which it is intended. Enclosures marked "Category A" are intended to be installed in areas accessible to the unsupervised general public; enclosures marked "Category B" are intended to be installed in areas accessible to authorized personnel only; and enclosures marked "Category C" are intended to be installed in areas accessible to qualified personnel only.

An enclosure which has been investigated to determine it is rainproof is marked "Rainproof," "Outdoor" or "3R." The enclosure may be either non-ventilated or ventilated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate articulated unit substations in this category is ANSI/IEEE C37.121 (1989), "Switchgear - Unit Substations - Requirements."

The basic standards used to investigate integral unit substations in this category are:

- IEEE C37.20.2 (1999), "Metal-Clad Switchgear"
- ANSI/NEMA C37.55 (2002), "Switchgear - Medium Voltage Metal-Clad Assemblies - Conformance Test Procedures"
- ANSI/IEEE C37.20.3 (2001), "Metal-Enclosed Interrupter Switchgear"
- ANSI/NEMA C37.57 (2003), "Switchgear - Metal-Enclosed Interrupter Switchgear Assemblies - Conformance Testing"
- UL 1562, "Transformers, Distribution, Dry-Type - Over 600 Volts"
- IEEE C57.12.00 (2010), "General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers"

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, the product name "Unit Substation Section," and "___ of ___," where the first space is stamped with a number indicating the position (reading from left to right) that the section occupies in the series of sections constituting the unit substation, and the second space indicates the total number of sections which are provided as part of the unit substation.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

VALVES, ELECTRIC FOR USE IN HAZARDOUS LOCATIONS
(YTSX)

VALVES, ELECTRIC FOR USE IN HAZARDOUS LOCATIONS (YTSX)

GENERAL

This category covers electrically operated valves (designated as general-purpose valves or safety valves). Such valves that may be equipped with complementary or optional mechanical actuators are also covered under this category.

General-purpose valves are intended to control the flow of fluids, but should not be depended upon to act as safety valves. They may be normally closed or normally open valves.

Safety valves are normally closed valves of the "On" and "Off" type, intended to be actuated by a safety control or an emergency device to prevent the unsafe delivery of fluids. They may also be used as general-purpose valves. Multiple-port valves may be designated as safety valves only with respect to their normally closed port.

Unless otherwise indicated, these valves are intended for connection to rigid conduit in an ambient temperature normally prevailing in habitable spaces and for handling fluids at a temperature not exceeding 25°C (77°F).

Identification of the specific fluid(s) for which the valve is certified, together with the fluid temperature and ambient temperature ratings, is (1) included in installation instructions, (2) shown on the smallest carton in which the valve is packaged, or (3) marked on the valve or on a tag attached to the valve.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is UL 429, "Electrically Operated Valves."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "General Purpose Valve for Hazardous Locations" or "Safety Valve for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

VENDING MACHINES (YWXV)

GENERAL

This category covers commercial vending machines, which include payment-accepting machines for vending nonrefrigerated food and beverages, general merchandise, etc.

This equipment may be either cord or permanently connected to the source of supply in accordance with ANSI/NFPA 70, "National Electrical Code."

Vending machines of certain types are designated for permanent connection to water supplies and sewer lines at the point of installation. Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

Accessories, such as a coin/currency mechanism and debit/credit card readers, may be field installed. Unless proper and obvious installation of the accessory is evident, instructions for installing the accessory are provided as part of the vending machine.

The burglary and theft protection features of these machines have not been investigated unless specifically indicated in the individual certifications.

PRODUCT MARKINGS

These products are marked with the manufacturer's name, model number and electrical rating.

These appliances are marked on or adjacent to the electrical rating plate with one of the following: "Suitable for Indoor Use Only," "Suitable for Protected Locations — See Installation Instructions" or "Suitable for Outdoor Use." Complete instructions appear on an appliance intended for use in a protected location, indicating the manufacturer's recommendations concerning the use or installation, or both, of any canopy, marquee, shelter, etc., that may be necessary for the protection of the appliance. The instructions may be located inside the appliance if they are accessible through the front door.

VENDING MACHINES (YWXV)

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REBUILT PRODUCTS

This category also covers vending machines that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt vending machines are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt vending machines are subject to the same requirements as new vending machines.

RELATED PRODUCTS

Machines for vending refrigerated food and beverages are covered under Vending Machines, Refrigerated (SQMX).

Games, rides and similar payment-accepting amusement products are covered under Amusement and Gaming Machines (ASMU).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 751, "Vending Machines."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Vending Machine," or other appropriate product name as shown in the individual Listings.

For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

VENTILATING EQUIPMENT FOR COMMERCIAL COOKING APPLIANCES (YXLT)

Ventilating equipment includes Exhaust Hoods With or Without Exhaust Dampers, Power Ventilators for Restaurant Exhaust Appliances, Grease Ducts, Grease Duct Enclosures, and Hood and Duct Accessories intended for installation in ventilating systems serving commercial cooking equipment. This equipment is intended for installation in accordance with the National Fire Protection Association Standard for the Installation of Equipment for the Removal of Smoke and Grease Laden Vapors from Commercial Cooking Equipment, NFPA 96, or other recognized codes or standards as indicated for the individual product categories.

In addition, Recirculating Ductless Hoods for Use with Specified Commercial Cooking Appliances are also included in this Section.

EXHAUST HOODS WITH EXHAUST DAMPERS (YXZR)

GENERAL

This category covers exhaust hoods with exhaust dampers intended to be installed over commercial cooking equipment. These hoods are provided with fire-actuated exhaust dampers. They have been investigated to determine that they are capable of preventing the exhaust duct gas temperatures from exceeding 375°F and the passage of flame into the exhaust duct under conditions simulating a fire in the cooking area under a hood. Electrical components, if provided, are investigated as part of the certification of the hood assembly.

Exhaust hoods with exhaust dampers may be provided with manually or automatically operated cleaning or washing systems. These systems are not investigated for grease-extraction efficiency. These systems are not investigated for their suitability as fire-extinguishing-system units for the protection of grease-removal devices and hoods, unless specifically indicated in the individual certifications and product markings on the hood.

Exhaust hoods with exhaust dampers may be provided with sprinklers or automatic spray nozzle assemblies for protection of unlimited length of grease duct in accordance with ANSI/NFPA 13, "Installation of Sprinkler Systems." If provided, it will be indicated in the individual certifications and product markings on the hood. The sprinklers or automatic spray nozzle assemblies intended for the protection of grease ducts are intended to be installed in accordance with ANSI/NFPA 13.

These devices are intended for installation in accordance with ANSI/NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," and ANSI/NFPA 70, "National Electrical Code."

All exhaust hoods with exhaust dampers are marked relative to minimum exhaust air flow and maximum supply air flow directed into the

Exhaust Hoods with Exhaust Dampers (YXZR)—Continued

hood and/or out the bottom (if provided). Air-flow rates are established under draft-free laboratory conditions. Greater exhaust and/or lesser supply air-flow rates may be required for each specific installation to obtain complete vapor and smoke removal.

Exhaust hoods provided with integral installed sprinklers or automatic spray nozzle assemblies for the protection of unlimited length of grease ducts are marked "Supplied With Factory Installed (Sprinklers) (Spray Nozzles) for the protection of unlimited length of Grease Duct having a maximum duct (diameter) (perimeter) of (inches) (feet). Connect to NFPA 13 sprinkler system water supply only."

Authorities Having Jurisdiction should be consulted before installation.

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

The basic standard used to investigate products in this category is ANSI/UL 710, "Exhaust Hoods for Commercial Cooking Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names:

- (A) "Exhaust Hood with Exhaust Damper"
- (B) "Hood Assembly for Exhaust Hood with Exhaust Damper for Use Only with [Company Name] Labeled Sub-Assembly for Exhaust Hood with Exhaust Damper Part No. ____"
- (C) "Sub-Assembly for Exhaust Hood with Exhaust Damper, Part No. ____ for Use Only with [Company Name] Labeled Hood Assembly for Exhaust Hood with Exhaust Damper"

Exhaust hoods with exhaust dampers that are complete in one factory-built assembly bear a Listing Mark with a product name similar to (A).

Exhaust hoods with exhaust dampers that consist of a hood assembly and one or more sub-assemblies bear a Listing Mark with the product name shown in (B) on the hood assembly and a Listing Mark with the product name shown in (C) on each sub-assembly.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

HOODS/RECIRCULATING SYSTEMS FOR USE WITH SPECIFIED COMMERCIAL COOKING APPLIANCES (YZCT)

USE AND INSTALLATION

This category covers products intended for installation with specific certified commercial cooking appliances, such as fryers, griddles, broilers and other appliances, that are installed in commercial establishments where food is prepared.

Recirculating systems consist of a fan, collection hood, and an air-filtering system consisting of a grease filter, and may incorporate other air-filtering devices. These systems incorporate a fire-extinguishing system that has been investigated with the specified cooking equipment.

These recirculating systems are intended for venting filtered cooking effluent into the room in which the equipment is located. These products are not intended for connection to a ducted exhaust system.

Authorities Having Jurisdiction should be consulted before installation.

RELATED PRODUCTS

Products intended for connection to a ducted exhaust system are covered under Exhaust Hoods with Exhaust Dampers (YXZR) and Exhaust Hoods Without Exhaust Dampers (YYCW).

Commercial cooking appliances with integral recirculating ventilation systems are covered under Commercial Cooking Appliances with Integral Recirculating Ventilation Systems (KNKG).

Commercial cooking appliances with integral systems for limiting the emission of grease-laden air are covered under Commercial Cooking Appliances with Integral Systems for Limiting the Emission of Grease-laden Air (KNLZ).

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 710B, "Recirculating Systems" (formerly ANSI/UL 197 Supplement SB, "Commercial Electric Cooking Appliances with Recirculating Systems") and ANSI/UL 197, "Commercial Electric Cooking Appliances."

UL MARK

Hoods/Recirculating Systems for Use with Specified Commercial Cooking Appliances (YZCT)—Continued

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT NAME*]

FOR USE WITH UL LISTED [Company name] MODEL(S) COMMERCIAL COOKING APPLIANCE(S)

Control No.

* RECIRCULATING SYSTEM or DUCTLESS HOOD

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

POWER VENTILATORS FOR RESTAURANT EXHAUST APPLIANCES (YZHW)

GENERAL

This category covers power roof- and wall-mounted ventilators and proximity-type ventilators consisting of an impeller and motor in a housing. Roof- and wall-mounted ventilators have a weather-resistant housing and are supported by a weather-resistant steel base designed to fit, by means of a steel curb, over a roof- or wall-exhaust duct opening for venting restaurant cooking appliances.

These ventilators are designed for the removal of smoke and grease-laden vapors at an exhaust air temperature not exceeding the maximum temperature indicated in the individual certifications and on the certified device.

Power ventilators for restaurant exhaust appliances are intended for installation in accordance with ANSI/NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations." Authorities Having Jurisdiction should be consulted to determine that these appliances are acceptable for use in any given location.

Proximity-type ventilators have an enclosure and are positioned adjacent to the cooking appliance that they serve.

RELATED PRODUCTS

Other types of power ventilators are covered under Ventilators, Power (ZACT).

ADDITIONAL INFORMATION

For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 705, "Power Ventilators," in addition to the requirements contained in UL Subject 762, "Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Ventilator for Restaurant Exhaust Appliances."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

VENTILATORS, POWER (ZACT)

GENERAL

This category covers roof- and wall-mounted power ventilators and duct fans consisting of an impeller and motor installed in a housing. Roof- and wall-mounted power ventilators have a weather-resistant housing and are supported by a weather-resistant base intended to fit, by means of a curb, over a wall or roof opening.

These ventilators are intended primarily for commercial or industrial use and are for the purpose of ventilation only. These ventilators consist of exhaust-type and makeup-air-type devices. Makeup-air-type ventilators equipped for evaporative cooling are covered under Humidifiers (AHIV).

Duct fans intended to move heated air are investigated to determine the effect of heated air on electrical components and are marked with the maximum temperature of the air.

VENTILATORS, POWER (ZACT)

Power ventilators intended for use where they will be exposed to weather are investigated to determine the effect of rain on electrical components.

These ventilators have not been investigated for installation in fire walls or from the standpoint of their effect on venting in case of fire. Their location should be determined after consultation with the Authority Having Jurisdiction.

RELATED PRODUCTS

Ventilators intended for the primary removal of grease-laden vapors and residues over restaurant cooking appliances are covered under Power Ventilators for Restaurant Exhaust Appliances (YZHW).

For other types of fans and blowers, see Fans, Electric (GPWV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 705, "Power Ventilators."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Ventilator."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

INDUSTRIAL MATERIAL HANDLERS (ZAJJ)

USE

This category covers industrial material handlers intended for continuous movement of material-laden air.

This equipment is intended for exhausting, material conveying, pollution control and air circulation, and is certified as to risk of electric shock and mechanical hazards only.

Industrial material handlers are intended to be installed in accordance with the installation instructions packaged with the equipment and ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Ventilators, Power (ZACT), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 705, "Power Ventilators."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**INDUSTRIAL MATERIAL HANDLER
AS TO ELECTRIC SHOCK AND MECHANICAL HAZARD ONLY
Control No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**VENTILATORS, POWER FOR USE IN
HAZARDOUS LOCATIONS (ZANE)**

GENERAL

This category covers roof- and wall-mounted power ventilators and duct fans consisting of an impeller and motor installed in a housing. Roof- and wall-mounted power ventilators have a weather-resistant housing and are supported by a weather-resistant base intended to fit, usually by means of a curb, over a wall or roof opening. Power ventilators consist of an assembly of UL-certified parts.

These ventilators are intended for industrial use and are for the purpose of ventilation only. These ventilators consist of exhaust type and makeup air type devices. Makeup air-type ventilators are not equipped for evaporative cooling.

**VENTILATORS, POWER FOR USE IN HAZARDOUS LOCATIONS
(ZANE)**

Power ventilators intended for use where they will be exposed to weather are investigated to determine the effect of rain on electrical components.

These ventilators have not been investigated for installation in fire walls or from the standpoint of their effect on venting in case of fire. Their location should be determined after consultation with the Authority Having Jurisdiction.

These ventilators are not intended for the primary removal of grease-laden vapors and residues over restaurant cooking appliances.

Metallic impellers are constructed of medium brass or aluminum, with a hardness not over Rockwell B66. Belt-driven power ventilators are investigated for the potential risk of ignition from temperature as a result of belt slippage.

Duct fans intended to move heated air are investigated to determine the effect of heated air on electrical components and are marked with the maximum temperature of the air.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 705, "Power Ventilators."

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Ventilator for Use in Hazardous Locations," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**ELECTRICAL INDUSTRIAL
VIBRATORS FOR USE IN
HAZARDOUS LOCATIONS (ZBRX)**

USE

This category covers devices designed to produce controlled vibration by electromagnetic means or motor-rotor eccentrics, and that have provisions for mounting to impart the vibrating motion to industrial material-handling equipment, such as sieves and hoppers.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified locations standard used to investigate products in this category is ANSI/UL 674, "Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations," or the requirements contained in UL Subject 1836, "Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2 and Class II, Division 2 Hazardous (Classified) Locations."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Industrial Vibrator for Hazardous Locations," "Industrial Vibrator for Hazardous Locations" or "Industrial Vibrator-Motor for Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

PRODUCT CATEGORIES BY CATEGORY CODE

ELECTRICAL INDUSTRIAL VIBRATORS FOR USE IN HAZARDOUS LOCATIONS (ZBRX)

VIDEO AND AUDIO EQUIPMENT, PROFESSIONAL (ZCZY)

USE AND INSTALLATION

This category covers video and audio monitoring, processing, receiving, recording, and reproducing equipment and accessories intended for use and maintenance by technically trained professional personnel in broadcast and recording studios, remote field locations, head end facilities, or similar controlled access locations.

Many of these units and systems require special installation such as a separate transformer, power supply, special grounding methods, special mounting, special cable construction, or interconnection between units by means of one or more of the wiring methods outlined in ANSI/NFPA 70, "National Electrical Code." Such features are covered in the manufacturer's installation instructions.

Information concerning field-wiring connections, mounting location, mounting method, clearances, servicing, and the like, are marked on the unit or specified in instructions accompanying the unit.

PRODUCT TYPES

Professional video and audio equipment includes video and audio tape recorders, editing, processing and amplification equipment, signal transmission equipment, television cameras, video monitors, and the like.

Accessory equipment includes wall-mounting brackets, console enclosures, battery packs, and racks intended for use with professional video and audio equipment.

RELATED PRODUCTS

For video tape recorders, video cameras and related accessories intended for household or commercial use, see Audio/Video Apparatus (AZSQ) and Audio and Video Equipment (AZUJ).

For television receivers, commercial and household video monitors and video products incorporating a cathode ray tube display, see Audio/Video Apparatus (AZSQ) and Audio and Video Equipment (AZUJ).

For household audio tape recorders and players, and related accessories, see Audio/Video Apparatus (AZSQ) and Audio and Video Equipment (AZUJ). For commercial audio and radio equipment, systems and accessories, see Commercial Audio and Radio Equipment, Systems and Accessories (AZJX), and also Audio/Video Apparatus (AZSQ). For commercial phonographs, tape playing and recording equipment, see Commercial Phonographs, Tape Playing and Recording Appliances and Accessories (AZQW) and Audio/Video Apparatus (AZSQ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1419, "Professional Video and Audio Equipment."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Professional Video Equipment," "Professional Audio Equipment" or "Professional Video Product," or other appropriate product name as shown in the individual Listings.

Equipment rack systems consist of an equipment rack and one or more audio or video components such as amplifiers, equalizers, VCRs and similar equipment. Each component installed in the rack that does not bear the UL Mark is identified by type and model number on a tag that is permanently attached to the rack. If all components installed in the rack bear the UL Listing Mark, the tag is not required.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

VISCOMETERS FOR USE IN HAZARDOUS LOCATIONS (ZCFV)

USE AND INSTALLATION

This category covers portable instruments for determining viscosities of fluids in locations where specified flammable gases or vapors may be present.

The flexible cord connected to the units should be frequently inspected and replaced when necessary.

VISCOMETERS FOR USE IN HAZARDOUS LOCATIONS (ZCFV)

Authorities Having Jurisdiction should be consulted with regard to conditions under which these portable devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Viscometer for Use in Hazardous Locations."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WASTE DISPOSERS (ZDHR)

USE AND INSTALLATION

This category covers waste disposers intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

Commercial waste disposers, because of the volume of material handled and the manner in which they are utilized, do not necessarily incorporate the safeguards which are a part of the household type. Commercial units are intended to be utilized only by competent personnel who are fully instructed concerning the hazards involved.

RELATED PRODUCTS

For incinerator-type waste disposers, see Incinerators, Special Type (NEGT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 430, "Waste Disposers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Waste Disposer," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WASTE DISPOSERS, PULPER TYPE (ZDIB)

GENERAL

This category covers commercial pulper-type waste disposers that are intended to grind food waste, food-service products such as paper, cardboard, plastic utensils and wrapping materials, and general office waste.

The waste materials are ground in a chamber supplied with running water to produce a slurry, which is then conveyed to a waterpress assembly by an auger-type drive. Excess water is pressed out of the pulpy waste, and the waste water is discharged into a sanitary drain or recycled back to the grinding chamber. The de-watered pulp is disposed of in a waste container.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 430, "Waste Disposers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Pulper-type Waste Disposer," or other appropriate product name as shown in the individual Listings.

Waste Disposers, Pulper Type (ZDIB)—Continued

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WASTE DISPOSERS, REPLACEMENT TYPE, HOUSEHOLD (ZDIF)**GENERAL**

This category covers replacement waste disposers intended to replace specific manufacturers' certified waste disposers (see ZDHR). They are intended for field installation using existing sink-mounting hardware.

These units are rated 150 V or less and are intended to convert primarily organic types of waste material to a form that can be accommodated by a soil pipe attached to household plumbing systems. These units are motor operated and are provided with overcurrent or overheating protective devices.

The performance and design of these units have been determined to comply with ANSI/ASSE 1008/AHAM FWD-2PR (1989), "Plumbing Requirements for Household Food Waste Disposer Units," when installed as intended with the appropriate sink-mounting hardware.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 430, "Waste Disposers."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**REPLACEMENT WASTE DISPOSER
FOR USE WITH [identification of specified product]
Control No.**

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WASTE DISPOSERS, SINK MOUNTED (ZDII)**USE AND INSTALLATION**

This category covers waste disposers for household or commercial use which are intended to convert primarily organic types of waste material to a form that can be accommodated by the soil pipe attached to plumbing systems. These units are motor operated and are provided with overcurrent or overheating protective devices. These products are intended for installation and use in accordance with ANSI/NFPA 70, "National Electrical Code."

The performance and design of household food-waste disposers have been determined to comply with the latest edition of ANSI/ASSE 1008, "Performance Requirements for Plumbing Aspects of Residential Food Waste Disposer Units," which covers household food-waste disposers installed in a kitchen sink, supplied with water from the sink faucet, and discharged into the plumbing drainage system.

Commercial waste disposers having provisions for mounting to a 3-1/2 in. diameter sink flange or opening and to a 1-1/2 in. diameter or less trade size plumbing drain have also been determined to comply with ANSI/ASSE 1008.

RELATED PRODUCTS

For other types of waste disposers, see Waste Disposers, Pulper Type (ZDIB).

For replacement waste disposers, see Waste Disposers, Replacement Type, Household (ZDIF).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 430, "Waste Disposers."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up

Waste Disposers, Sink Mounted (ZDII)—Continued

Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Waste Disposer," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIND TURBINE GENERATING SYSTEMS (ZGAA)**INSTALLATION OF LIGHTNING PROTECTION SYSTEMS FOR WIND TURBINES (ZGBI)****GENERAL**

This category covers the installation of lightning protection systems for wind turbines to protect them from damage by lightning. The issuance of a UL Certificate is evidence that the installation of the lightning protection system (1) has been made by an installer that subscribes to UL's Follow-Up Service, (2) employs lightning protection assemblies and components subject to factory inspection service and bears the UL Mark, and (3) is subject to a field inspection program covering proper installation of the system. The wind turbine assemblies that incorporate lightning protection components are covered under Lightning Protection Assemblies for Wind Turbines (ZGBS).

RELATED PRODUCTS

See:

Lightning Conductors, Air Terminals and Fittings (OVTZ)
Lightning Protection System Installations (OWAY)
Lightning Protection Assemblies for Wind Turbines (ZGBS)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/NFPA 780 (2010), "Installation of Lightning Protection Systems," or IEC 61400-24 (2011), "Wind Turbines - Part 24: Lightning Protection."

UL CERTIFICATE

The UL Certificate is the only method provided by UL to identify lightning protection systems covered under its Certificate and Follow-Up Service. Installations for which Certificates are issued are considered by UL to be compliant with the applicable requirements at the time of issuance. The Certificate is limited to the number of years for which it has been issued and must be renewed to remain in effect.

UL maintains a factory inspection service for counterchecking conductors, air terminals and fittings, and also a field inspection service for counterchecking installations.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LARGE WIND TURBINE GENERATING ASSEMBLIES, CONSTRUCTION ONLY (ZGBP)**USE AND INSTALLATION**

This category covers large wind turbine generating assemblies (WTGA) investigated for compliance of internal and external electrical hardware to applicable component standards, and interconnection of the electrical hardware to applicable standards or codes.

Large WTGA are defined as turbines with a rotor-swept area larger than 200 m² (16 m rotor diameter).

Large WTGA consist of various electrical hardware components and subassemblies constructed and interconnected in accordance with electrical safety requirements to create a complete wind turbine. These systems are most often assembled on-site in multiple sections.

The electrical equipment systems covered under this category are intended for installation in accordance with Article 705 of ANSI/NFPA 70, "National Electrical Code."

Large Wind Turbine Generating Assemblies, Construction Only (ZGBP)—Continued

Component converters and safety-related control systems may be suitable for this assembly construction category; as these component investigations vary in the type and level of testing to which they are subjected by the component standard, additional testing may be needed in the wind turbine system to address their performance. Systems covered under Large Wind Turbine Generating Systems (ZGAA) have undergone this system testing.

RELATED PRODUCTS

Wind Turbine Safety-related Control System Equipment (ZGCP)
Large Wind Turbine Generating Systems (ZGAA)
Small Wind Turbine Generating Systems (ZGEN)
Wind Turbine Inverters and Converters (ZGFA)
Wind Turbine Generating System Components (ZGFN2)
Static Inverters and Converters for Use in Independent Power Systems (QIKH)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 6140, "Outline of Investigation for Wind Turbine Generating Systems."

UL MARK

The Classification Mark of UL on the major subassemblies of the wind turbine is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

LARGE WIND TURBINE GENERATING ASSEMBLY IN ACCORDANCE WITH UL SUBJECT 1640

+ SUBASSEMBLY

++ OF +++ TOTAL SUBASSEMBLIES

Control No.

+ Name of subassembly (e.g., NACELLE, BLADE, TOWER SECTION)

++, +++ Indicates the number of assemblies included in the complete wind turbine (e.g., 1 of 5, 2 of 5, 3 of 5)

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LIGHTNING PROTECTION ASSEMBLIES FOR WIND TURBINES (ZGBS)

GENERAL

This category covers lightning protection assemblies intended for installation as part of Installation of Lightning Protection Systems for Wind Turbines (ZGBI). These assemblies are intended to be part of an overall system that is built into wind turbines to protect them from damage caused by lightning.

RELATED PRODUCTS

See:
Lightning Conductors, Air Terminals and Fittings (OVTZ)
Lightning Protection System Installations (OWAY)
Large Wind Turbine Generating Assemblies, Construction Only (ZGBP)
Large Wind Turbine Generating Systems (ZGAA)
Small Wind Turbine Generating Systems (ZGEN)
Wind Turbine Inverters and Converters (ZGFA)
Wind Turbine Generating System Components (ZGFN2)
Static Inverters, Converters and Accessories for Use in Independent Power Systems (QIKH)

For manufacturers of Listed ground rods suitable for use in installations of lightning protection equipment, see Grounding and Bonding Equipment (KDER).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/NFPA 780 (2011), "Installation of Lightning Protection Systems," or IEC 61400-24 (2010), "Wind Turbines - Part 24: Lightning Protection."

UL Subject 6140, "Outline of Investigation for Wind Turbine Generating Systems," references these standards for turbines that incorporate lightning protection.

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the

Lightning Protection Assemblies for Wind Turbines (ZGBS)—Continued

UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

LIGHTNING PROTECTION * FOR WIND TURBINES IN ACCORDANCE WITH **

Control No.

* ASSEMBLY, BLADE, NACELLE, TOWER, or other appropriate product name as shown in the individual Classifications

** ANSI/NFPA 780 or IEC 61400-24

For multi-piece units, the Classification Mark appears on each outside enclosure section constituting a complete system eligible for Classification. The Classification Mark covers only the enclosure section to which it is affixed; it does not cover other enclosure sections included in the system. Each enclosure section of a Classified system is provided with a "Section ___ of ___" marking, where the second blank indicates the total number of enclosure sections contained in the Classified system and the first blank indicates the respective enclosure section number bearing the UL Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIND TURBINE SAFETY-RELATED CONTROL SYSTEM EQUIPMENT (ZGCP)

GENERAL

This category covers wind turbine safety-related control system equipment for large and small wind turbine generating systems (WTGS). Wind turbine safety-related control system equipment is intended for use with specific wind turbine generating systems.

The electrical equipment covered under this category is intended for installation in accordance with Article 705 of ANSI/NFPA 70, "National Electrical Code."

WTGS safety-related control system equipment is investigated to perform specific wind turbine control and protection functions to maintain the overall system within the manufacturer's specified operational limits. These control and protection functions are investigated with respect to risk of electric shock and fire, and electrical response time. The electrical subassemblies that address power transfer control and protection functions investigated under this category are intended to be coordinated with a mechanical and structural evaluation of the WTGS in accordance with standards such as IEC 61400 Set, "Wind Turbine Generating Systems," or "Guideline for the Certification of Wind Turbines" (published by Germanischer Lloyd WindEnergie GmbH).

The safety-related control system (SRCS), as defined in UL Subject 6140, "Outline of Investigation for Wind Turbine Generating Systems," embodies the "Control System" and "Protection System" functions defined in IEC 61400 and "Guideline for the Certification of Wind Turbines."

FIRMWARE VERSION AND CHECKSUM

Version Number — Identification number of the software elements that specifies the investigated software version and current release.

Checksum or Unique Identifier — A unique identifier stored in nonvolatile memory computed as a function of the critical and supervisory sections of the software.

RELATED PRODUCTS

Large Wind Turbine Generating Assemblies, Construction Only (ZGBP)
Large Wind Turbine Generating Systems (ZGAA)
Small Wind Turbine Generating Systems (ZGEN)
Wind Turbine Inverters and Converters (ZGFA)
Wind Turbine Generating System Components (ZGFN2)
Static Inverters and Converters for Use in Independent Power Systems (QIKH)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 6140, "Outline of Investigation for Wind Turbine Generating Systems."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

WIND TURBINE SAFETY-RELATED CONTROL SYSTEM* IN ACCORDANCE WITH UL SUBJECT 6140

Control No.

Wind Turbine Safety-related Control System Equipment (ZGCP)–Continued

* or other appropriate product name as shown in the individual Classifications

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIND TURBINE DRIVE-TRAIN SYSTEMS AND EQUIPMENT (ZGDT)

USE AND INSTALLATION

This category covers wind turbine drive-train systems and equipment investigated with respect to risk of electric shock and fire. These assemblies are intended to be coordinated with a separate mechanical and structural investigation of the wind turbine generating system in accordance with standards such as IEC 61400-1, "Wind Turbine Generating Systems," or "Guideline for the Certification of Wind Turbines" (published by Germanischer Lloyd WindEnergie GmbH).

These drive-train systems and equipment may be suitable for use within Large Wind Turbine Generating Assemblies, Construction Only (ZGBP) based upon the drive-train ratings. Additional testing of the drive-train system and equipment may be necessary to determine its performance within the end-product turbine to establish certification under Large Wind Turbine Generating Systems (ZGEA).

The wind turbine drive train contains equipment and combinations of equipment such as gearboxes (with associated heaters, lubrication system and sensors), generators (with associated heating, lubrication system and sensors), blade-pitch systems, yaw motors (electrical), slip rings, or other rotating electrical components that transfer to power controls or communication between rotating or moving parts. This equipment is intended to be installed in compliance with the enclosure mounting, spacing and segregation requirements of the overall wind turbine.

RELATED PRODUCTS

- See:
 - Large Wind Turbine Generating Assemblies, Construction Only (ZGBP)
 - Large Wind Turbine Generating Systems (ZGEA)
 - Small Wind Turbine Generating Systems (ZGEN)
 - Wind Turbine Inverters and Converters (ZGFA)
 - Wind Turbine Generating System Components (ZGFN2)
 - Static Inverters, Converters and Accessories for Use in Independent Power Systems (QIKH)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 6140, "Outline of Investigation for Wind Turbine Generating Systems."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

[PRODUCT NAME*]

AS TO ELECTRIC SHOCK AND FIRE HAZARDS ONLY
Control No.

*** WIND TURBINE DRIVE-TRAIN EQUIPMENT or WIND TURBINE DRIVE-TRAIN SYSTEM**

For multi-piece units, the Classification Mark appears on each outside enclosure section constituting a complete system eligible for Classification. The Classification Mark covers only the enclosure section to which it is affixed; it does not cover other enclosure sections included in the system. Each enclosure section of a Classified system is provided with a "Section ___ of ___" marking, where the second blank indicates the total number of enclosure sections contained in the Classified system and the first blank indicates the respective enclosure section number bearing the UL Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

LARGE WIND TURBINE GENERATING SYSTEMS (ZGEA)

GENERAL

This category covers large wind turbine generating systems (WTGS) investigated for risk of fire and shock, including safety-related control system electrical performance and grid interconnection performance.

Large WTGS are defined as wind turbines with a rotor-swept area larger than 200 m² (16 m rotor diameter). Large WTGS consist of various electrical hardware subassemblies and safety-related control systems constructed and interconnected in accordance with electrical safety requirements to create a complete wind turbine. These systems are typically assembled on-site in multiple sections.

Safety-related control system performance is defined as the electrical hardware and software operation of the controls and protection functions up to the electromechanical interface of the associated power and control circuits. The ability of the mechanical systems to perform control and protection functions has not been investigated.

Electric utility grid interconnection performance is investigated to limits defined by the manufacturer for synchronization, overvoltage, undervoltage, overfrequency, underfrequency, clearing times, reconnect time, power factor, DC injection, harmonic distortion, unintentional islanding, power range and low-voltage ride-through (if provided).

The electrical equipment systems covered under this category are intended for installation in accordance with Article 705 of ANSI/NFPA 70, "National Electrical Code."

CODES

The following summarizes and defines the codes shown in the individual Classifications.

Output Type	OT
Utility Interactive Stand-alone	UI SA
Multimode Open Transition	MMOT
Multimode Closed Transition	MMCT
Charger	C
Utility Testing	UT
Has been investigated for anti-islanding*	AI
Has been investigated for over/undervoltage and frequency fluctuations with fixed trip limits*	FTL
Has been investigated for over/undervoltage and frequency fluctuations with adjustable trip limits*	ATL
Has not been investigated for anti-islanding and may need external protection as required by local interconnection requirements	NAI
Has not been investigated for over/undervoltage and frequency fluctuations and may need external protection as required by local interconnection requirements	NTL
Has been investigated for reverse current protection at the point of common coupling (PCC)	RCP
Has been investigated for low-voltage ride-through**	LVR
* As required by UL 1741, "Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources," and IEEE 1547, "IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems"	
** As required by IEC 61400-21, "Wind Turbines – Part 21: Measurement and Assessment of Power Quality Characteristics of Grid Connected Wind Turbines"	
Surge Category per IEEE C62.41, "IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits"	SC
Category A (Least severe; applies to equipment some distance after the service entrance)	A
Category B (Mid-severity; applies to equipment installed between Category A and C)	B
Category C (Most severe; typically applied to equipment at or before the service entrance)	C
Isolation	Isol
Internal Transformer	IT
Transformerless	TL

PRODUCT CATEGORIES BY CATEGORY CODE

Large Wind Turbine Generating Systems (ZGAA)—Continued

Isolation	Isol
External Transformer Specific*	ETS
External Transformer Generic*	ETG
* See manufacturer's specifications for external transformer ratings, construction and configuration	
Input/Output Power Configuration	POC
Single-phase 2-wire	S2
Single-phase 3-wire	S3
Three-phase 3-wire	T3
Three-phase 4-wire	T4
Maximum AC Utility Grid/Branch Overcurrent Protection	MOCP
Current rating in amps (example: 200 A)	200
Note: Not applicable for Stand-alone units	
Maximum Ambient of Continuous Operation at Full Rated Power	MAFP
Ambient rating in degrees Celsius (example: 50C)	50
Maximum Ambient of Operation	MA
Ambient rating in degrees Celsius (example: 60C)	60

FIRMWARE VERSION AND CHECKSUM

Firmware version and checksum are identified for all critical program-mable components. Verification and tracking are most often addressed within the individual certifications for Wind Turbine Inverters and Converters (ZGFA) and Wind Turbine Safety-related Control Systems (ZGCP).

Version Number — Identification number of the software elements that specifies the investigated software version and current release.

Checksum or Unique Identifier — A unique identifier stored in nonvola-tile memory computed as a function of the critical and supervisory sections of the software.

RELATED PRODUCTS

- Large Wind Turbine Generating Assemblies, Construction Only (ZGBP)
- Wind Turbine Safety-related Control System Equipment (ZGCP)
- Small Wind Turbine Generating Systems (ZGEN)
- Wind Turbine Inverters and Converters (ZGFA)
- Wind Turbine Generating System Components (ZGFN2)
- Static Inverters and Converters for Use in Independent Power Systems (QIKH)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 6140, "Outline of Investigation for Wind Turbine Generating Systems."

UL MARK

The Classification Mark of UL on the major subassemblies of the wind turbine is the only method provided by UL to identify products manufac-tured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

LARGE WIND TURBINE GENERATING SYSTEM IN ACCORDANCE WITH UL SUBJECT 6140

+ SUBASSEMBLY
++ OF +++ TOTAL SUBASSEMBLIES
Control No.

+ Name of subassembly (e.g., NACELLE, BLADE, BASE SECTION, TOWER SECTION)

++, +++ Indicates the number of assemblies included in the complete wind turbine (e.g., 1 of 5, 2 of 5, 3 of 5)

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SMALL WIND TURBINE GENERATING SYSTEMS (ZGEN)

GENERAL

Small Wind Turbine Generating Systems (ZGEN)—Continued

This category covers small wind turbine generating systems (WTGS) investigated for risk of fire and shock, including safety-related control sys-tem electrical performance and utility (grid) interconnection performance for Utility Interactive models.

Small wind turbines are considered to be wind turbines where a user or service person cannot or is not intended to enter the turbine to operate it or perform maintenance.

Safety-related control system performance is defined as the electrical hard-ware and software operation of the controls and protection functions up to the electromechanical interface of the associated power and control circuits.

Wind turbines provided with an inverter or converter are classed as Util-ity Interactive, Stand-alone or Multimode. Utility Interactive devices operate in parallel with the utility grid. Stand-alone devices are intended to operate independent of the utility grid. Multimode devices can operate as both or either Stand-alone (utility independent) or Utility Interactive (grid-tie).

Electric utility grid interconnection performance is investigated to IEEE 1547, "IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems."

Mounting means, support structures, wind turbine blades and/or rotors are investigated only to the extent that they include the necessary electrical components to comply with the applicable electrical safety standards.

These devices are intended for installation in accordance with Articles 694 and 705 of ANSI/NFPA 70, "National Electrical Code."

Some devices in this category are intended to be installed and operated with an external transformer. Such devices are provided with markings and instructions to indicate the type of transformer required.

These devices may require external output overcurrent protection, which is specified in product markings and installation instructions.

CODES

The following summarizes and defines the codes shown in the individual Classifications.

	Turbine Parameters	
Swept area	ft ² (m ²)	ft ² (m ²)
Rated rotational speed		RPM
Maximum rotational speed (n _{max})		RPM
	Output Type	
Utility Interactive		UI
Stand-alone		SA
Multimode Open Transition		MMOT
Multimode Closed Transition		MMCT
Charger		C

	Utility Testing	
Has been investigated for anti-islanding*		AI
Has been investigated for over/undervoltage and frequency fluctuations with fixed trip limits*		FTL
Has been investigated for over/undervoltage and frequency fluctuations with adjustable trip limits*		ATL
Has not been investigated for anti-islanding and may need external protection as required by local interconnection requirements		NAI
Has not been investigated for over/undervoltage and frequency fluctuations and may need external protection as required by local interconnection requirements		NTL
Has been investigated for reverse current protection at the point of common coupling (PCC)		RCP

* As required by UL 1741, "Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources," and IEEE 1547

Surge Category per IEEE C62.41, "IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits"

Category A (Least severe; applies to equipment some distance after the service entrance)	A
Category B (Mid-severity; applies to equipment installed between Category A and C)	B
Category C (Most severe; typically applied to equipment at or before the service entrance)	C

WIND TURBINE GENERATING SYSTEMS (ZGAA)

Small Wind Turbine Generating Systems (ZGEN)—Continued

	Isolation	
Internal Transformer		IT
Transformerless		TL
External Transformer Specific*		ETS
External Transformer Generic*		ETG
* See manufacturer's specifications for external transformer ratings, construction and configuration		

	Output Power Configuration	
Single-phase 2-wire		S2
Single-phase 3-wire		S3
Three-phase 3-wire		T3
Three-phase 4-wire		T4
Direct current		DC

	Maximum Branch Overcurrent Protection	
Current rating in amps (example: 20 A)		20
Not applicable for Stand-alone units		NA

	ANSI/UL 50, "Enclosures for Electrical Equipment," Enclosure Rating	
12		12
3		3
4		4

	Maximum Ambient of Continuous Operation at Full Rated Power	
Ambient rating in degrees Celsius (example: 40C)		40

	Maximum Ambient of Operation	
Ambient rating in degrees Celsius (example: 60C)		60

	Output Ratings	
Voltage (nominal)		240/120
Frequency (Hz) (nominal)		60
Maximum output power		2.8 kW
Wind speed for maximum output power		20 mph (9 m/s)
Amperage		20 A
VA		2.8 kVA
Power factor		1
Processor	ABC Company, Type ABC123	
Firmware version and checksum	Rev. 1.02.0	
	CRC: 15820	

FIRMWARE VERSION AND CHECKSUM

Version Number — Identification number of the software elements that specifies the investigated software version and current release.

Checksum or Unique Identifier — A unique identifier stored in non-volatile memory computed as a function of the critical and supervisory sections of the software.

RELATED PRODUCTS

- Large Wind Turbine Generating Assemblies, Construction Only (ZGBP)
- Wind Turbine Safety-related Control System Equipment (ZGCP)
- Large Wind Turbine Generating Systems (ZGEA)
- Wind Turbine Inverters and Converters (ZGFA)
- Wind Turbine Generating System Components (ZGFN2)
- Static Inverters and Converters for Use in Independent Power Systems (QIKH)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 6142, "Small Wind Turbine Systems."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

SMALL WIND TURBINE GENERATING SYSTEM* IN ACCORDANCE WITH UL 6142

Control No.

* or other appropriate product name as shown in the individual Classifications

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufac-

WIND TURBINE GENERATING SYSTEMS (ZGAA)

Small Wind Turbine Generating Systems (ZGEN)—Continued

turer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIND TURBINE INVERTERS AND CONVERTERS (ZGFA)

GENERAL

This category covers permanently-connected inverters and converters intended for use in wind-generated electric power systems. Inverters are devices that change DC power to AC power. Converters are devices that accept AC or DC power input and convert it to another form of AC or DC power for direct utilization by a load or accumulation in an energy storage system (batteries, capacitors, etc.). Wind-power systems are defined as facilities that deliver wind-generated electric power to a load. Devices covered under this category are classed as Utility Interactive, Stand-alone or Multimode. Utility Interactive devices operate in parallel with the utility grid. Stand-alone devices are intended to operate independent of the utility grid. Multimode devices can operate as both or either Stand-alone (utility independent) or Utility Interactive devices.

These products may contain energy storage devices and associated charge controllers.

The electrical equipment systems covered under this category are intended for installation in accordance with Article 705 of ANSI/NFPA 70, "National Electrical Code."

Some devices in this category are intended to be installed and operated with an external transformer. Such devices are provided with markings and instructions to indicate the type of transformer required.

These devices may require external input and/or output overcurrent protection, which is specified in product markings and installation instructions.

When applicable, wind turbine converters may be identified as wind turbine safety-related controls systems to denote their additional Classification for wind turbine control and protection functions. For details on wind turbine safety-related control system functions, see Wind Turbine Safety-related Control System Equipment (ZGCP).

CODES

The following summarizes and defines the codes shown in the individual Listings.

Source Type		ST
Wind turbine		WT
Battery		B
Other		O

Output Type		OT
Utility Interactive		UI
Stand-alone		SA
Multimode Open Transition		MMOT
Multimode Closed Transition		MMCT
Charger		C

Utility Testing		UT
Has been investigated for anti-islanding*		AI
Has been investigated for over/undervoltage and frequency fluctuations with fixed trip limits*		FTL
Has been investigated for over/undervoltage and frequency fluctuations with adjustable trip limits*		ATL
Has not been investigated for anti-islanding and may need external protection as required by local interconnection requirements		NAI
Has not been investigated for over/undervoltage and frequency fluctuations and may need external protection as required by local interconnection requirements		NTL
Has been investigated for reverse current protection at the point of common coupling (PCC)		RCP
Has been investigated for low-voltage ride-through**		LVR

* As required by UL 1741, "Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources," and IEEE 1547, "IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems"

** As required by IEC 61400-21, "Wind Turbines – Part 21: Measurement and Assessment of Power Quality Characteristics of Grid Connected Wind Turbines"

Wind Turbine Inverters and Converters (ZGFA)—Continued

Isolation	Isol
Internal Transformer	IT
Transformerless	TL
External Transformer Specific*	ETS
External Transformer Generic*	ETG
* See manufacturer's specifications for external transformer ratings, construction and configuration	
Input/Output Power Configuration	POC
Single-phase 2-wire	S2
Single-phase 3-wire	S3
Three-phase 3-wire	T3
Three-phase 4-wire	T4
Maximum Branch Overcurrent Protection	MOCB
Current rating in amps (example: 200 A)	200
Not applicable for Stand-alone units	NA
ANSI/UL 50, "Enclosures for Electrical Equipment," Enclosure Rating	ER
12	12
3	3
4	4
Maximum Ambient of Continuous Operation at Full Rated Power	MAFP
Ambient rating in degrees Celsius (example: 50C)	50
Maximum Ambient of Operation	MA
Ambient rating in degrees Celsius (example: 60C)	60
Surge Category per IEEE C62.41, "IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits"	SC
Category A (Least severe; applies to equipment some distance after the service entrance)	A
Category B (Mid-severity; applies to equipment installed between Category A and C)	B
Category C (Most severe; typically applied to equipment at or before the service entrance)	C
Wind Turbine Safety-related Control Systems	SRCS
Has been investigated for safety-related control system functions	CF
Has not been investigated for safety-related control system functions	NCF

FIRMWARE VERSION AND CHECKSUM

Version Number — Identification number of the software elements that specifies the investigated software version and current release.

Checksum or Unique Identifier — A unique identifier stored in nonvolatile memory computed as a function of the critical and supervisory sections of the software.

RELATED PRODUCTS

- Large Wind Turbine Generating Assemblies, Construction Only (ZGBP)
- Wind Turbine Safety-related Control System Equipment (ZGCP)
- Large Wind Turbine Generating Systems (ZGEA)
- Small Wind Turbine Generating Systems (ZGEN)
- Wind Turbine Generating System Components (ZGFN2)
- Static Inverters and Converters for Use in Independent Power Systems (QIKH)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 6141, "Outline of Investigation for Wind Turbine Converters and Interconnection Systems Equipment."

UL Subject 6141 requires that all converters be investigated for both normal and abnormal conditions associated with the application (less electric utility "grid" interconnection protection). For electric-utility-connected con-

Wind Turbine Inverters and Converters (ZGFA)—Continued

verters this includes the investigation of the unit's ability to parallel two sources of power, operate during normal utility operating conditions, provide a minimum level of output power quality including DC injection, and operate safely during abnormal utility grid conditions defined by the manufacturer's specified product ratings.

UL Subject 6141 contains direct references to UL 1741, "Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources," and IEEE 1547, "IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems," to address the most common distribution level utility grid interconnection protection requirements. UL Subject 6141 also allows for the use of IEC 61400-21, "Wind Turbines - Part 21: Measurement and Assessment of Power Quality Characteristics of Grid Connected Wind Turbines" (2nd Edition), to investigate converters intended to provide electric utility grid support via low-voltage ride-through (LVRT).

Products that have not been investigated for electric utility "grid" interconnection protection are marked to indicate that the electric utility grid interconnection protection functions have not been investigated and need to be addressed at the end installation with the local utility Authority Having Jurisdiction per local codes and standards. This will often require the installation of additional electric utility interconnection protection equipment and field testing per the local utility interconnection requirements.

ADJUNCT SERVICE

UL provides a service for the Classification of wind turbine inverters and converters that not only meet the requirements of UL Subject 6141 but also have been investigated for wind turbine safety-related control system functions in accordance with UL Subject 6140, "Outline of Investigation for Wind Turbine Generating Systems."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name. The product name is the combination of the specific DG source and the type of inverter or converter product. Acceptable product designations include:

- "Wind Turbine Utility Interactive Inverter"
- "Wind Turbine Stand-alone Converter"
- "Wind Turbine Multimode Inverter"

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with UL Subject 6140. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the statement "ALSO CLASSIFIED IN ACCORDANCE WITH UL SUBJECT 6140."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIND TURBINE TOWER ASSEMBLIES (ZGTA)

USE AND INSTALLATION

This category covers wind turbine tower assemblies investigated with respect to risk of electric shock and fire. These assemblies are intended to be coordinated with a separate mechanical and structural investigation of the wind turbine generating system in accordance with standards such as IEC 61400-1, "Wind Turbine Generating Systems," or "Guideline for the Certification of Wind Turbines" (published by Germanischer Lloyd WindEnergie GmbH).

These tower assemblies may be suitable for use within Large Wind Turbine Generating Assemblies, Construction Only (ZGBP) based upon the drive-train ratings. Additional testing of the drive-train system and equipment may be necessary to determine its performance within the end-product turbine to establish certification under Large Wind Turbine Generating Systems (ZGEA).

The wind turbine tower contains equipment and combinations of equipment such as lights, service power outlets, communication devices, cable trays, wireways, busways, etc. This equipment is intended to be installed in compliance with the installation, mounting, spacing and segregation requirements of the overall wind turbine as specified by the manufacturer.

RELATED PRODUCTS

- See:
- Large Wind Turbine Generating Assemblies, Construction Only (ZGBP)
 - Large Wind Turbine Generating Systems (ZGEA)
 - Small Wind Turbine Generating Systems (ZGEN)
 - Wind Turbine Inverters and Converters (ZGFA)
 - Wind Turbine Generating System Components (ZGFN2)

WIND TURBINE GENERATING SYSTEMS (ZGAA)

Wind Turbine Tower Assemblies (ZGTA)—Continued

Static Inverters, Converters and Accessories for Use in Independent Power Systems (QIKH)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 6140, "Outline of Investigation for Wind Turbine Generating Systems."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**WIND TURBINE TOWER ASSEMBLY
AS TO ELECTRIC SHOCK AND FIRE HAZARDS ONLY
Control No.**

For multi-piece units, the Classification Mark appears on each tower section constituting a complete system eligible for Classification. The Classification Mark covers only the tower section to which it is affixed; it does not cover other tower sections included in the system. Each tower section of a Classified system is provided with a "Section ____ of ____" marking, where the second blank indicates the total number of tower sections contained in the Classified tower system and the first blank indicates the respective tower section number bearing the UL Mark.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

**WIND TURBINE GENERATING SYSTEM
SUBASSEMBLIES (ZGZJ)**

USE

This category covers subassemblies, such as blades, towers, generators, gear boxes, control panels and yaw drives, intended for field installation for use only with specific wind turbine generating systems.

PRODUCT MARKINGS

The correct combination of wind turbine generating systems and subassemblies is indicated by markings on or with the subassembly and/or the wind turbine generating system.

RELATED PRODUCTS

Equipment intended to provide a primary, secondary, or primary and secondary power source to nonspecific loads in parallel or separate from the utility is investigated to UL 1741, "Inverters, Converters, and Controllers for Use in Independent Power Systems," and covered under Static Inverters and Converters for Use in Independent Power Systems (QIKH). Examples of this equipment are Utility Interactive, Stand-alone, Multi-mode inverters or converters, and Interconnection System Equipment.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is IEC 61400-1, "Wind Turbines – Part 1: Design Requirements," or IEC 61400-2, "Wind Turbine Generator Systems – Part 2: Safety of Small Wind Turbines," or other applicable standard(s).

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**[PRODUCT NAME]*
IN ACCORDANCE WITH +
Control No.**

* WIND TURBINE GENERATOR or WIND TURBINE BLADE, or other appropriate product name as shown in the individual Classifications + IEC STANDARD 61400-1-[issue date] or IEC STANDARD 61400-2-[issue date], or other applicable standard(s)

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

WIND TURBINE GENERATING SYSTEMS (ZGAA)

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Wind Turbine Generating System Subassemblies (ZGZJ)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIND TURBINE TRAY CABLE (ZGZN)**GENERAL**

This category covers wind turbine tray cable intended for use in accordance with Article 336 of ANSI/NFPA 70, "National Electrical Code" (NEC). The cable consists of one or more pairs of thermocouple extension wire or two or more insulated conductors, with or without one or more grounding conductors, with or without one or more optical fiber members and covered with a nonmetallic jacket. A single grounding conductor may be insulated or bare and may be sectioned. Any additional grounding conductors are fully insulated and have a distinctive surface marking. The cable is rated 90 – 200°C dry and optionally rated 90°C wet, 1000 V.

The cable is certified in conductor sizes 18 AWG to 1000 kcmil copper, or 12 AWG to 1000 kcmil aluminum or copper-clad aluminum. Conductor sizes within a cable may be mixed. Thermocouple extension conductors are certified in sizes 24 to 12 AWG.

PRODUCT MARKINGS

Cable with copper-clad aluminum conductors is surfaced printed "AL (CU-CLAD)" or "Cu-clad AL."

Cable with aluminum conductors is surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "Compact Copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors bear the marking "Terminate with connectors identified for use with compact-stranded copper conductors." For termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

The dry and wet temperature rating(s) of the cable is marked on the surface of the cable.

Cable investigated for use where exposed to direct rays of the sun is marked "Sunlight Resistant."

Cable consisting of thermocouple extension wire is surface marked "THCPL EXTN," "For thermocouple extension use only" or "Thermocouple extension wire only."

Cable surface marked "Oil Resistant I" (or "Oil Res I") is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is surface marked "Oil Resistant II" (or "Oil Res II").

Cable that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surface marked with the suffix "-LS."

Cable containing optical fiber members is identified with the suffix "-OF."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2277, "Outline of Investigation for Flexible Motor Supply Cable and Wind Turbine Tray Cable."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Wind Turbine Tray Cable."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WELDING MACHINES (ZGLZ)**USE**

This category covers portable and stationary transformer-type arc-welding equipment rated 600 V or less. This equipment is intended to be installed in accordance with Article 630 of ANSI/NFPA 70, "National Electrical Code."

Some arc-welding machines have a so-called "welding-range" involving an excess secondary-current output capacity beyond that indicated by the

marked secondary rating on the machines. This excess capacity (generally not more than 150% of the marked output capacity) is usually supplied by means of one or more secondary taps in addition to the tap or taps intended for normal output current; and the higher currents thus available are intended to provide for heavier welding work, including the use of larger size electrodes. This excess capacity is somewhat analogous to the inherent overload capacity of motors and transformers, and it is not covered at present by any definite requirements and is not investigated. However, the abuse of this excess current capacity — the overloading of a welding machine, except for relatively short periods of time — may be hazardous and should receive careful consideration by all those concerned.

RELATED PRODUCTS

See Motor Generator Sets (PQYW).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 551, "Transformer-Type Arc-Welding Machines".

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Welding Machine," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WELDING MACHINE ACCESSORIES (ZGPU)**USE**

This category covers products designed to be used with certified arc-welding machines, such as wire feeders and vacuum units for welding-smoke removal. This category also covers arc-cutting equipment, such as arc-cutting power supplies, for industrial applications. These products are intended for installation and use in accordance with ANSI/NFPA 70, "National Electrical Code."

ADDITIONAL INFORMATION

For additional information, see Welding Machines (ZGLZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 551, "Transformer Type Arc-Welding Machines."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Welding Machine Accessory;" or other appropriate product name as shown in the individual Listings.

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WHEELCHAIR LIFTS AND STAIRWAY CHAIRLIFTS (ZGUW)**USE**

This category covers permanently connected vertical and inclined wheelchair platform lifts and inclined stairway chairlifts for use by the physically disabled in both commercial and private residence locations.

This category also covers indoor, cord-connected, inclined stairway chairlifts for use by the physically disabled in private residence locations.

This category also covers outdoor, cord-connected, vertical platform lifts for use by the physically disabled in commercial locations.

Cord-connected lifts are intended to be installed as stationary devices.

This category does not cover portable lifts.

ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM).

REQUIREMENTS

The basic standards used to investigate products in this category are ASME A18.1 (1999), "Safety Code for Platform Lifts and Stairway Chair-

lifts," ASME A17.5 (1996), "Elevator and Escalator Electrical Equipment," and other UL requirements appropriate for the type of equipment involved.

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Wheelchair Lift" or "Stairway Chairlift," or other appropriate product name as shown in the individual Listings.

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WIRE (ZGZX)

This category covers insulated wire intended for installation and use in accordance with ANSI/NFPA 70, "National Electrical Code." Construction details are specified in the individual wire categories.

BUS DROP CABLE (ZIMX)**GENERAL**

This category covers multiple-conductor bus drop cable as described in Sec. 368.56(B) of ANSI/NFPA 70, "National Electrical Code" (NEC), and intended for use in accordance with Article 368 and other applicable parts of the NEC. The cable consists of three or four Type TW, THW, THHN and THWN, or XHHW, RHW and RHH conductors cabled together with a grounding conductor with an overall jacket. The cable is rated 600 V, 60, 75, 90 or 105°C.

PRODUCT MARKINGS

Cable marked "Oil Resistant 60C" is suitable for exposure to oil at 60°C.

Cable marked "Oil Resistant 75C" is suitable for exposure to oil at 75°C.

Cable marked "Water Resistant" is suitable for immersion in water.

Cable marked "Outdoor" is suitable for installation outdoors.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 509, "Outline of Investigation for Bus Drop Cable."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Bus Drop Cable."

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FESTOON CABLE (ZIFP)**GENERAL**

This category covers single- and multiple-conductor festoon cable intended for use and installation in accordance with Article 610 of ANSI/NFPA 70, "National Electrical Code." The cable consists of one or more insulated conductors cabled together with an overall jacket. The cable is rated 600 V, 60, 75, 90 or 105°C.

PRODUCT MARKINGS

Cable marked "Oil Resistant 60C" is suitable for exposure to oil at 60°C.

Cable marked "Oil Resistant 75C" is suitable for exposure to oil at 75°C.

Cable marked "Outdoor" or "Outdoor Use" is suitable for installation outdoors.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2273, "Outline of Investigation for Festoon Cables."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products

WIRE (ZGZX)

Festoon Cable (ZIPF)—Continued

manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Festoon Cable."

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FIXTURE WIRE (ZIPR)

GENERAL

This category covers fixture wire for use in accordance with Article 402 of ANSI/NFPA 70, "National Electrical Code."

All conductors are copper; however, fixture wire having a temperature rating higher than 90°C may employ nickel.

Thermoplastic compounds tend to stiffen at temperatures below -10°C (14°F) and care should be taken in handling at such temperatures.

Gasoline-resistant wire has been tested at 23°C when immersed in gasoline. It is considered inherently resistant to gasoline vapors within the limits of the temperature rating of the wire type.

Gasoline-resistant TFN or TFFN — Indicates a TFN and TFFN conductor with a jacket of extruded nylon suitable for exposure to mineral oil, and to liquid gasoline and gasoline vapors at ordinary ambient temperature. It is identified by tag marking and by printing on the insulation or nylon jacket with the designation "Type TFN (TFFN) Gasoline and Oil Resistant I" if suitable for exposure to mineral oil at 60°C, or "Type TFFN (TFFN) Gasoline and Oil Resistant II" if suitable for exposure to mineral oil at 75°C.

Wire that complies with a special Vertical Flame Test is marked "VW-1." Fixture wire is designated as follows:

60°C maximum operating temperature	Thermoplastic-insulated wire: 600 V, 18-16 AWG: Types TF, TFF
75°C maximum operating temperature	Thermoset-insulated, heat-resistant wire: 600 V, 18-16 AWG: Types RFH-2, FFH-2
90°C maximum operating temperature	Thermoplastic-insulated wire: 600 V, 18-16 AWG: Types TFN, TFFN Thermoset-insulated, heat-resistant wire: 600 V, 18-16 AWG: Types RFHH-2, RFHH-3
150°C maximum operating temperature	Silicone rubber-insulated wire: 300 V, 18 AWG: Type SFF-1 600 V, 18-14 AWG: Type SFF-2 Fluorinated ethylene propylene-insulated wire: 600 V, 18-14 AWG: Types PFF, PGFF Polytetrafluoroethylene-insulated wire: 600 V, 18-14 AWG: Type PTFE Cross-linked polyolefin-insulated wire: 300 V, 18-10 AWG: Types XF, XFF Ethylene tetrafluoroethylene-insulated wire: 600 V, 18-14 AWG: Types ZF, ZFF
200°C maximum operating temperature	Silicone rubber-insulated wire: 300 V, 18 AWG: Type SF-1 600 V, 18-14 AWG: Type SF-2 Fluorinated ethylene propylene-insulated wire: 600 V, 18-14 AWG: Types PF, PGF Aromatic polyimide tape insulated wire: 300 V, 18-10 AWG: Types KF-1, KFF-1 600 V, 18-10 AWG: Types KF-2, KFF-2 Ethylene tetrafluoroethylene-insulated wire: 600 V, 18-14 AWG: Type ZHF
250°C maximum operating temperature	Polytetrafluoroethylene-insulated wire: 600 V, 18-14 AWG: Type PTF

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 66, "Fixture Wire."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the

WIRE (ZGZX)

Fixture Wire (ZIPR)—Continued

Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fixture Wire."

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FLEXIBLE CORD (ZJ CZ)

GENERAL

This category covers flexible cord constructed and certified for use in accordance with Article 400 of ANSI/NFPA 70, "National Electrical Code" (NEC). All conductors are stranded copper, except for tinsel cord.

Voltage Ratings

"Clock Cord" is rated 125 V.

Types C (14 - 10 AWG), PD (14 - 10 AWG), E (12 - 2 AWG), ETT (12 - 2 AWG), ETP (12 - 2 AWG), EO (12 - 2 AWG), S, SO, SOO, SOW, SOOW, ST, STO, STOO, STW, STOW, STOOW, SE, SEO, SEOO, SEW, SEOW and SEOOW are rated 600 V.

Types C (18 - 16 AWG), PD (18 - 16 AWG) "Shaver cord," E (20 - 12 AWG), ETT (20 - 12 AWG), ETP (20 - 12 AWG), EO (20 - 12 AWG), SV, SVO, SVOO, SVE, SVEO, SVEOO, SVT, SVTO, SVTOO, SJ, SJO, SJOO, SJOW, SJOOW, SJE, SJEI, SJEIO, SJEIOO, SJEIOW, SJEIOOW, SJT, SJTO, SJTOO, SJTOW, SJTOOW, SPT-1, SPT-1W, SPT-2, SPT-2W, SPT-3, SPE-1, SPE-2, SPE-3, SP-1, SP-2, SP-3, NISP-1, NISP-2, NISP-1, NISP-2, NISPE-1, NISPE-2, XTW, CXTW, SRD, SRDE, SRDT, TPT, TST, HPD, HPN, HSI, HSJO, HSJOW, HSJOO and HSJOOW are rated 300 V.

Types E, EO, ETT and ETP in 12 AWG are rated 300 or 600 V, depending on insulation thickness.

Conductor Sizes

The conductor size ranges are as specified in the NEC with the following exceptions:

Types HSJOW and HSJOOW have the same conductor size range as HSJO and HSJOO, respectively.

Types XTW, 22 - 18 AWG; CXTW, 22 - 18 AWG; "Clock Cord," 20 AWG; and "Shaver Cord," 27 and 20 AWG.

Temperature Ratings

Types C, PD, SP-1, SP-2, SP-3, NISP-1, NISP-2, SRD, E, EO, ETP, ETT, TPT, TST and "Shaver Cord" are rated 60°C.

Types XTW and CXTW are rated 105°C.

Types SPE-1, SPE-2, SPE-3, SVE, SVEO, SVEOO, SJE, SJEI, SJEIO, SJEIOW, SJEIOOW, SE, SEO, SEOO, SEW, SEOW, SEOOW, NISPE-1, NISPE-2, SRDE, HPD, HPN, HSI, HSJO, HSJOW, HSJOO and HSJOOW are rated 90 or 105°C.

"Clock Cord" is rated 60 or 105°C.

Types SV, SVO and SVOO are rated 60, 75 or 90°C.

Types S, SO, SOO, SOW, SOOW, SJ, SJO, SJOO, SJOW, SJOOW, SVT, SVTO, SVTOO, SJT, SJTO, SJTOO, SJTW, SJTOW, SJTOOW, ST, STO, STOO, STW, STOW, STOOW, NISP-1, NISP-2, SPT-1, SPT-1W, SPT-2, SPT-2W, SPT-3, and SRDT are rated 60, 75, 90 or 105°C.

Cord Types or Characteristics Not Covered by the NEC

Type XTW is a parallel assembly of two to six conductors intended for use in decorative-lighting equipment.

Type CXTW is a single conductor or twisted assembly of two conductors intended for use in decorative-lighting equipment.

"Clock Cord," which has no Type designation, is similar to Type XTW except for conductor size.

"Shaver Cord," which has no Type designation, is similar to Type TPT except for the conductor configuration.

Types HSJOW and HSJOOW are outdoor-use versions of types HSJO and HSJOO, respectively.

Types SPT-1W and SPT-2W may contain three conductors.

Types S, SO, SOO, SOW, SOOW, SJ, SJO, SJOO, SJOW, SJOOW, SVT, SVTO, SVTOO, SJT, SJTO, SJTOO, SJTW, SJTOW, SJTOOW, ST, STO, STOO, STW, STOW, STOOW, NISP-1, NISP-2, SPT-1, SPT-1W, SPT-2, SPT-2W, SPT-3, SRDT, SPE-1, SPE-2, SPE-3, SVE, SVEO, SVEOO, SJE, SJEI, SJEIO, SJEIOW, SJEIOOW, SE, SEO, SEOO, SEW, SEOW, SEOOW, NISPE-1, NISPE-2, SRDE, HPD, HPN, HSI, HSJO, HSJOW, HSJOO, HSJOOW, SP-1, SP-2, SP-3, NISP-1, NISP-2, SRD, SV, SVO and SVOO, 18 - 14 AWG may be additionally suffixed "-R."

Compatibility

Due to possible incompatibility, TPE material of a styrenic type is, in some cases, not suitable for use in cords where direct contact with PVC can occur. A separator is one acceptable means of avoiding direct contact. Other combinations of materials that could be incompatible, if any, are as yet undetected.

PRODUCT MARKINGS

PRODUCT CATEGORIES BY CATEGORY CODE

Flexible Cord (ZICZ)–Continued

All cord is surface printed with “UL” in a circle or parentheses, the type designation, temperature rating, voltage rating, flame rating, size and number of conductors.

Cord marked “For Mobile Home Use,” “For Recreational Vehicle Use” or “For Mobile Home and Recreational Vehicle Use,” followed by the current rating in amps, indicates suitability for use in mobile homes or recreational vehicles.

“W” indicates suitability for use outdoors and for immersion in water. The low-temperature rating for this cord is -40°C unless otherwise marked on the cord with optional ratings of -50, -60 or -70°C. The low-temperature ratings are determined by means of a bend test (not a suppleness test) at the given temperature. The cord may be additionally marked “Water Resistant.”

“VW-1” indicates that the cord complies with a Vertical Flame Test. Cord that has been investigated for leakage currents between the circuit conductor and the grounding conductor, and between the circuit conductor and the outer surface of the jacket, may have the values so marked on the cable jacket.

Cord investigated for mobile home use, recreational vehicle use, or mobile home and recreational vehicle use, or cord investigated for leakage current between conductors, may have the ampacity of the cord marked on the cord. In all other cases, the ampacity of the cord is not marked on the surface of the cord.

Designated cord types found in the NEC rated 300 or 600 V and 18 – 14 AWG may be suffixed by “-R.” This suffix indicates that the cord complies with additional mechanical abuse testing required by some appliance standards, including cord-connected fans and heaters.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 62, “Flexible Cords and Cables.”

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Flexible Cord.”

The Listing Mark for this category requires the use of a holographic label.

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FLEXIBLE MOTOR SUPPLY CABLE (ZJFH)**GENERAL**

This category covers flexible motor supply cable (flexible FVD servo cable) intended for use with variable frequency drives subjected to nonlinear power distortions in accordance with the applicable parts of ANSI/NFPA 70, “National Electrical Code.” The cable consists of two or more insulated conductors, with or without one or more grounding conductors, and covered with a nonmetallic jacket. A single grounding conductor may be insulated or bare and may be sectioned. Any additional grounding conductors are fully insulated and have a distinctive surface marking. The cable is rated 90°C, 1000 or 2000 V.

The cable is certified as a single conductor in sizes 22 AWG to 500 kcmil copper, and as a multiple-conductor cable in sizes 22 to 4/0 AWG. Conductor sizes within a cable may be mixed. Thermocouple extension conductors are certified in sizes 24 to 12 AWG.

PRODUCT MARKINGS

The temperature rating of the cable, 90°C, is marked on the surface of the cable.

Cable investigated for use where exposed to direct rays of the sun is marked “Sunlight Resistant.”

Cable consisting of thermocouple extension wire is surface marked “THCPL EXTN,” “For thermocouple extension use only” or “Thermocouple extension wire only.”

Cable surface marked “Oil Resistant I” (or “Oil Res I”) is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is surface marked “Oil Resistant II” (or “Oil Res II”).

Cable that complies with the Limited Smoke Test requirements specified in UL 1685, “Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables,” is surface marked with the suffix “-LS.”

Cable containing optical fiber members is identified with the suffix “-OF.”

ADDITIONAL INFORMATION**Flexible Motor Supply Cable (ZJFH)–Continued**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2277, “Outline of Investigation for Flexible Motor Supply Cable and Wind Turbine Tray Cable.”

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Flexible Motor Supply Cable.”

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GAS-TUBE-SIGN CABLE (ZJQX)**USE AND INSTALLATION**

This category covers gas-tube-sign cable certified as single conductor Type GTO-5, GTO-10 or GTO-15 rated 105°C – 250°C (221°F – 482°F) in sizes 18 – 10 AWG copper. The voltage rating of the cable in sizes 18 – 15 AWG is not intended to exceed 10,000 V. The voltage rating of the cable in sizes 14 – 10 AWG is not intended to be less than 10,001 V. This cable is intended for use with gas-tube systems for signs, outline lighting, and interior lighting in accordance with ANSI/NFPA 70, “National Electrical Code,” and ANSI/UL 48, “Electric Signs.”

PRODUCT MARKINGS

The cable is marked with a means of identifying the organization responsible for the manufacture of the cable, maximum voltage for which it is rated (5000 V, 10,000 V or 15,000 V), the maximum temperature and the AWG size.

Cable that complies with the requirements for GTO cable employing an integral sleeve is surface marked “Integral Sleeve.”

ADDITIONAL INFORMATION

For conductor terminal information and additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 814, “Gas-Tube-Sign Cable.”

GTO cable identified and marked “Integral Sleeve” used in enclosure assemblies with other neon sign components has also been investigated to ANSI/UL 879, “Electric Sign Components.”

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” and the product name “Gas-Tube-Sign Cable.”

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IRRIGATION FEEDER, CONTROL AND SIGNAL CABLE (ZJVK)**USE**

This category covers irrigation feeder, control and signal cable rated 300 or 600 V, 60 or 75°C. The insulated-conductor sizes are 18 AWG – 250 kcmil, solid or stranded copper. This cable is intended for direct burial and is used to:

- Supply power to irrigation machines (feeder cable),
- Send power and/or signals to irrigation machines (control cable), and/or
- Supply guidance to irrigation machines (signal cable).

This cable is not intended for indoor use or for any existing uses covered by ANSI/NFPA 70, “National Electrical Code.”

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

Irrigation Feeder, Control and Signal Cable (ZJVK)—Continued

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2571, "Outline of Investigation for Irrigation Feeder, Control, and Signal Cables."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Irrigation Feeder Cable," "Irrigation Control Cable" or "Irrigation Signal Cable."

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MACHINE-TOOL WIRE (ZKHZ)**GENERAL**

This category covers machine-tool wire and cable, which is all-thermoplastic Type MTW 600 V wire and cable for use as specified in ANSI/NFPA 70, "National Electrical Code," and NFPA 79, "Electrical Standard for Industrial Machinery." The finished wire or cable is flame retardant and suitable for use at 90°C (194°F) and lower temperatures in dry locations, and at 60°C (140°F) and lower temperatures where exposed to moisture, oil or coolants, that is, to cutting oils and the like.

The single-conductor constructions are:

- Construction A — All PVC-insulated
- Construction B — PVC-insulated with a nylon jacket

Both constructions are labeled in sizes 22 AWG to 1000 kcmil inclusive, stranded copper.

The multiple-conductor constructions consist of assemblies of these single-conductor constructions enclosed by a PVC jacket.

Single- and multiple-conductor wire and cable employing 16-10 AWG conductors having the stranding for flexing service are surface marked "flexing" or "Class K." This marking is optional for smaller conductors intended for flexing service.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1063, "Machine-Tool Wires and Cables."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Machine Tool Wire."

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PENDANT CABLE (ZKKA)**USE**

This category covers multiple-conductor cable intended for use indoors and outdoors as vertical-drop cable from a crane or hoist down to a pendant push-button station, or as a control cable in a crane and hoist system in accordance with Article 610 of ANSI/NFPA 70, "National Electrical Code." The wire is rated 300 or 600 V, and 60, 75, 90 or 105°C.

PRODUCT MARKINGS

The cable is marked with the Listee's name, trade name or file number.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2562, "Outline of Investigation for Pendant Cable."

UL MARK

The Listing Mark of UL on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is

Pendant Cable (ZKKA)—Continued

the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Pendant Cable."

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PHOTOVOLTAIC WIRE (ZKLA)**GENERAL**

This category covers single-conductor, insulated and integrally or nonintegrally jacketed, sunlight-resistant photovoltaic (PV) wire intended for interconnection wiring of grounded and ungrounded PV power systems as described in Section 690.31(A) and other applicable parts of ANSI/NFPA 70, "National Electrical Code."

PV wire is rated 600, 1000 or 2000 V, and is suitable for ac and dc systems. This wire is rated 90, 105, 125 or 150°C dry and 90°C wet. PV wire employs 12 AWG – 2000 kcmil stranded aluminum or copper-clad aluminum, or 18 AWG – 2000 kcmil stranded copper conductors.

PRODUCT MARKINGS

PV wire is marked on the outer surface of the insulation with the manufacturer's identification, the words "Photovoltaic Wire" (or "PV Wire"), voltage rating, conductor size, dry and wet temperature ratings, the words "Sunlight Resistant" (or "SUN RES"), nominal outside diameter, and date code (if not marked on the tag). PV wire having aluminum conductors is marked "AL," with or without "ACM." PV wire having copper-clad conductors is marked "ALUMINUM (COPPER-CLAD)" (or "AL (CU-CLAD)") or "COPPER-CLAD ALUMINUM" (or "CU-CLAD AL"). PV wire complying with the VW-1 flame test is marked "VW-1." PV wire complying with a cold impact test is marked "-40 C." PV wire may also optionally be marked "Direct Burial" (or "Dir Bur"), or "for direct burial" if it complies with crush and impact tests.

Each package of PV wire is tagged or marked with the manufacturer's identification, the words "Photovoltaic Wire" (or "PV Wire"), voltage rating, conductor size, dry and wet temperature ratings, "Sunlight Resistant" (or "SUN RES"), and date code (if not marked on the wire). If the PV wire contains aluminum conductors the tag is also marked "Aluminum" (or "AL"), or the markings are overprinted with the words "aluminum conductors," with the additional marking "ACM" being optional. PV wire having copper-clad conductors has a tag marking of "ALUMINUM (COPPER-CLAD)" (or "AL (CU-CLAD)") or "COPPER-CLAD ALUMINUM" (or "CU-CLAD AL") and the following statements:

1. "Copper-clad aluminum shall be used only with equipment marked to indicate that it is for use with aluminum conductors. Terminate copper-clad aluminum with pressure wire connectors marked AL-CU or CC-CU."
2. "Where physical contact between any combination of copper-clad aluminum, copper, and aluminum of a type marked for such intermixed use and the connection shall be limited to dry locations only."

PV wire complying with the VW-1 flame test is marked "VW-1" on the tag. PV wire complying with a cold impact test is marked "-40 C" on the tag. PV wire may also optionally be marked "Direct Burial" (or "Dir Bur"), or "for direct burial" if it complies with crush and impact tests.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 4703, "Outline of Investigation for Photovoltaic Wire."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photovoltaic Wire."

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PROCESSED WIRE (ZKLU)

GENERAL

This category covers Listed wire, flexible cord and cable, and Classified cable that has been subjected to processing subsequent to Labeling and identified as either processed wire or processed wire - respooled.

Listed wire, flexible cord and cable identified as "Listed Processed Wire" has been cut into certain lengths from which the insulation may be stripped from one or both ends. The stripped ends may be soldered or tinned and may have simple terminals of the eyelet, ring, open spade or quick-connect type attached by crimping, soldering or welding.

These lengths may be packaged for further processing. Single lengths of Listed processed wire and cable may be paralleled with other insulated wire and cable and may be held together by an open binder.

Products identified as "Listed Processed Wire - Respooled" are single, continuous lengths of Listed wire, flexible cord or cable cut from a longer length and coiled or placed on a spool or reel.

Products identified as "Classified Processed Wire" are Classified cable that has been cut into certain lengths from which the insulation may be stripped from one or both ends. These lengths may be packaged for further processing. Single lengths of Classified processed wire may be paralleled with other insulated cable and may be held together by an open binder.

Products identified as "Classified Processed Wire - Respooled" are single, continuous lengths of Classified cable cut from a long length and coiled or placed on a spool or reel.

The tag markings from the wire spooler reel (e.g., voltage, temperature, insulation thickness, usage) are provided on the processed wire tag attached to the product.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 62, "Flexible Cord and Fixture Wire," ANSI/UL 66, "Fixture Wire," ANSI/UL 83, "Thermoplastic-Insulated Wires and Cables," or ANSI/UL 44, "Thermoset-Insulated Wires and Cables," and ANSI/UL 486A-486B, "Wire Connectors," or ANSI/UL 486C, "Splicing Wire Connectors."

UL MARK

The Listing or Classification Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing or Classification and Follow-Up Service. The Listing or Classification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED" or "CLASSIFIED" respectively, a control number, and the product name "Processed Wire" or "Processed Wire - Respooled."

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RECREATIONAL VEHICLE CABLE, LOW VOLTAGE (ZKRU)

GENERAL

This category covers single-conductor, multi-conductor parallel and jacketed flat, parallel or round multiple-conductor recreational vehicle cable rated 90°C or higher, intended for use in low-voltage circuits as described in Article 551 and other applicable parts of ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

Cable marked "Oil Resistant 60C" is suitable for exposure to oil at 60°C. Cable marked "Oil Resistant 75C" is suitable for exposure to oil at 75°C. Cable marked "Outdoor" or "Outdoor Use" is suitable for installation outdoors.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2276, "Outline of Investigation for Recreational Vehicle Cable."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Recreational Vehicle Cable, Low Voltage."

Recreational Vehicle Cable, Low Voltage (ZKRU)—Continued

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TELECOMMUNICATION CENTRAL OFFICE POWER, BATTERY AND DISTRIBUTION CABLE (ZKSB)

USE

This category covers one- and two-conductor telecommunication central office power, battery and distribution cable for use in telecommunication central office power plants. The cable is rated 75, 90 or 105°C dry, optionally 60, 75 or 90°C wet, and 600, 1000 or 2000 V.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2731, "Outline of Investigation for Telecommunication Central Office Power, Battery, and Distribution Cables."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Telecommunication Central Office Power, Battery and Distribution Cable."

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TELEPHONE SERVICE DROP WIRE (ZKSG)

USE

This category covers single-pair and multiple-pair telephone drop wire intended for use as overhead conductors that extend telephone circuits (1) from the last utility pole or other outdoor support to the protector(s) within the building or other structure served, and (2) between buildings or other structures on the premises served. This wire is intended for use in accordance with Article 800 of ANSI/NFPA 70, "National Electrical Code."

PRODUCT MARKINGS

The wire is marked with the Listee's name, trade name or file number.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 523, "Outline of Investigation for Telephone Service Drop Wire."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Telephone Service Drop Wire."

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THERMOSET-INSULATED WIRE (ZKST)

GENERAL

This category covers thermoset-insulated wire and cable (tabulated below) which is flame retardant and rated 600 V, except for Types RHH, RHW and RHW-2 which may be rated 2000 V. The voltage rating is marked on the outer surface of the wire or cable.

PRODUCT MARKINGS

Thermoset-insulated Wire (ZKST)—Continued

RHW — Indicates a single conductor having a thermoset insulation, with or without a nonmetallic covering, rated 75°C dry, 75°C wet.

RHW-2 — Indicates a single conductor with the same description as Type RHW, except that it is rated 90°C dry, 90°C wet.

RHH — Indicates a single conductor with the same description as Type RHW, except that it is rated 90°C dry only.

XHH — Indicates a single conductor having a cross-linked synthetic polymer insulation with no overall covering provided, rated 90°C dry.

XHHW — Indicates a single conductor with the same description as Type XHH, except that it is rated 90°C dry, 75°C wet.

XHHW-2 — Indicates a single conductor with the same description as Type XHH, except that it is rated 90°C dry, 90°C wet.

SA — Indicates a single conductor having thermosetting silicone rubber insulation and a nonmetallic covering rated 90°C dry, general use, 200°C dry, special applications.

SIS — Indicates a single conductor having thermosetting insulation with no overall covering provided rated 90°C dry, for switchboard wiring only.

D — Used as a suffix indicating a twin wire having two insulated conductors laid parallel under an outer nonmetallic covering.

M — Used as a suffix indicating a cable having two or more insulated single conductors twisted together under an outer nonmetallic covering.

This wire, in sizes mentioned below, may employ copper, aluminum, or copper-clad aluminum conductors. Wire with copper-clad aluminum conductors is surface printed "Cu-Clad Al" or "AL (CU-CLAD)." Wire with aluminum conductors is surface printed "AL."

In addition to the required AWG or kcmil size, the metric equivalent may be marked on the wire, e.g. "6 AWG (13.3 MM²)" or "13.3 MM² (6 AWG)."

Types RHH, RHW, RHW-2, XHH, XHHW, XHHW-2 and SA are certified in sizes 14 AWG through 2000 kcmil copper, and 12 AWG through 2000 kcmil aluminum or copper-clad aluminum. Type SIS is certified in sizes 14 through 4/0 AWG copper, and 12 through 4/0 AWG aluminum or copper-clad aluminum.

Wire and cable employing compact-stranded copper conductors is so identified directly following the conductor size wherever it appears (surface, tag, carton or reel) by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

Wire bearing multiple type designations is suitable for the temperature associated with each use. For example, a wire marked "RHH or RHW" is suitable for 90°C in dry locations, and 75°C in wet locations.

Wire marked "GR I" or "GR II" has been tested at 23°C when immersed in gasoline and in oil at 60°C and 75°C, respectively. Wire marked "PR I" or "PR II" has been tested for immersion in oil at 60°C and 75°C, respectively.

Wire and cable marked "CT" complies with a Vertical-Tray Flame Test. Wire and cable marked "SR" complies with an artificial weathering test. The "CT" marking, with or without the "SR" marking, pertains to single conductor sizes 4 through 1 AWG for grounding conductors only, single conductor sizes 1/0 AWG and larger, and all sizes of multiconductor Types RHH, RHW, RHW-2, XHH, XHHW and XHHW-2.

Wire marked "VW-1" complies with a Vertical Flame Test; all others comply with a Horizontal Flame Test.

Wire that complies with the Limited Smoke Test requirements specified in ANSI/UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surface marked "ST1."

Wire and cable marked "-40 C" complies with a cold impact test conducted at that temperature. This does not necessarily mean that the cable can be easily installed at that temperature. Different installation conditions and configurations require that care be taken when installing cable at low temperatures.

Submersible Water Pump Cable — Indicates multiconductor cable in which two, three or four Type RHW, RHW-2, XHHW or XHHW-2 conductors are provided in a flat or twisted assembly. The cable is certified in sizes from 14 AWG through 500 kcmil copper, and from 12 AWG through 500 kcmil aluminum or copper-clad aluminum. The cable is tag marked, "For use within the well casing for wiring deep-well water pumps where the cable is not subject to repetitive handling caused by frequent servicing of the pump units." The surface of the wire may also be marked "Pump Cable." The cable has not been investigated for direct burial in the earth unless the single conductors carry an additional "Type USE" or "Type USE-2" marking.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 44, "Thermoset-Insulated Wires and Cables."

UL MARK

Thermoset-insulated Wire (ZKST)—Continued

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Thermoset-insulated wire that contains copper or copper-clad aluminum conductors has the product name "Insulated Wire"; thermoset-insulated wire that contains aluminum conductors has the product name "Insulated Aluminum Wire."

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THERMOPLASTIC-INSULATED WIRE (ZLGR)**USE**

This category covers thermoplastic-insulated wire for use in accordance with Article 310 of ANSI/NFPA 70, "National Electrical Code."

PRODUCT TYPES

Thermoplastic-insulated wire is rated 600 V and is designated as follows:

TW — Indicates a single conductor having flame-retardant, moisture-resistant thermoplastic insulation. The wire is rated 60°C wet or dry.

THHN — Indicates a single conductor having flame-retardant and heat-resistant thermoplastic insulation with a jacket of extruded nylon or equivalent material. The wire is rated 90°C dry only.

THW — Indicates a single conductor having flame-retardant, moisture- and heat-resistant thermoplastic insulation. The wire is rated 75°C wet or dry.

THW-2 — Same as THW except that the wire is rated 90°C wet or dry.

THHW — Indicates a single conductor having flame-retardant, moisture- and heat-resistant thermoplastic insulation. The wire is rated 90°C dry and 75°C wet.

THWN — Indicates a single conductor having flame-retardant, moisture- and heat-resistant thermoplastic insulation with a jacket of extruded nylon or equivalent material. The wire is rated 75°C wet or dry. THWN wire suitable for exposure to mineral oil and to liquid gasoline and gasoline vapors at ordinary ambient temperature is marked "Gasoline and Oil Resistant I" if suitable for exposure to mineral oil at 60°C, or "Gasoline and Oil Resistant II" if the compound is suitable for exposure to mineral oil at 75°C. Gasoline resistant wire has been tested at 23°C when immersed in gasoline. It is considered inherently resistant to gasoline vapors within the limits of the temperature rating.

THWN-2 — Same as THWN except that the wire is rated 90°C wet or dry.

FEP — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (fluorinated ethylene propylene) insulation. Type FEP wire is suitable for use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 200°C and lower temperatures for special applications.

FEPB — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (fluorinated ethylene propylene) insulation with a glass braid. Type FEPB wire is suitable for general use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 200°C and lower temperatures for special applications.

PFA — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (perfluoroalkoxy) insulation. Type PFA wire is suitable for use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 200°C and lower for special applications.

PFAH — Indicates a single, nickel or nickel-coated copper conductor having flame-retardant and heat-resistant thermoplastic (perfluoroalkoxy) insulation. The PFAH is suitable for use at 250°C and lower temperatures only for leads within apparatus or within raceways connected to apparatus, in dry locations only.

TFE — Indicates a single, nickel-coated copper or nickel base alloy conductor having flame-retardant and heat-resistant thermoplastic (polytetrafluoroethylene) insulation. Type TFE wire is suitable for use at 250°C and lower temperatures in dry locations as leads within apparatus or within raceways connected to apparatus or as open wiring.

Z — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (ethylene tetrafluoroethylene) insulation. Type Z wire is suitable for use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 150°C and lower temperatures for special applications.

Thermoplastic-insulated Wire (ZLGR)—Continued

ZW — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (ethylene tetrafluoroethylene) insulation. Type ZW wire is suitable for use in dry locations at 90°C or wet locations at 75°C. It is also suitable for use in dry locations at 150°C and lower temperatures for special applications.

ZW-2 — Same as ZW except that the wire is rated 90°C wet or dry.

TBS — Indicates a single conductor switchboard wire having thermoplastic insulation and a flame-retardant nonmetallic covering. Type TBS is suitable for use at 90°C and lower temperatures in dry locations.

PRODUCT MARKINGS

Types TW, THW, THW-2, THHN, THHW, THWN, THWN-2, PFA, PFAH and Z in sizes 4 to 1 AWG for grounding conductors only and in sizes 1/0 AWG and larger for circuit and grounding conductors that are marked "Cable Tray Use" or "CT" comply with a vertical-tray cable flame test. Wire so marked may additionally be marked "Sunlight Resistant" indicating compliance with an artificial weathering test.

Types TW, THW, THW-2, THHN, THHW, THWN and THWN-2 in all sizes that are marked "Sunlight Resistant" comply with an artificial weathering test.

Wire suitable for exposure to mineral oil is marked "Oil Resistant I" for 60°C oil resistance, or "Oil Resistant II" for 75°C oil resistance, on the surface of the wire. An Oil Resistant marking, by itself, does not include resistance to gasoline or similar light petroleum solvents.

Wire that complies with a special vertical flame test is surface marked "VW-1."

Constructions in this category that comply with a flame and smoke test (as described in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables") may have the additional marking "ST1" indicating "Limited Smoke." (Note: The suffix "-LS," added to the Type letters, has also been used to indicate Limited Smoke. Effective November 15, 2004, only "ST1" may be used.)

In place of three of the markings described above, the following multinational markings may be used:

"SR" in place of "Sunlight Resistant"

"PR" in place of "Oil Resistant"

"GR" in place of "Gasoline and Oil Resistant"

Submersible Pump Cable — Indicates multiconductor cable consisting of two or three flat or two to six twisted insulated conductors with or without an overall jacket. The cable is labeled in size 14 AWG to 500 kcmil copper, and 12 AWG to 500 kcmil aluminum or copper-clad aluminum. The cable is tag marked "For Wiring Only Between Equipment Located at Water Well Heads and Motors of Installed Deep-Well Submersible Water Pumps." The insulation is surface marked "Submersible Pump Cable." The cable has not been investigated for direct burial in the earth.

Wire, in sizes mentioned below, may employ copper or aluminum, or copper-clad aluminum conductors. Wire with copper-clad aluminum conductors is surface printed "AL (CU-CLAD)" or "Cu-Clad AL." Wire with aluminum conductors is surface printed "AL."

Wire and cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for product employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

SIZE AND CONDUCTOR INFORMATION

Types TW, THW and THW-2 are certified in sizes 14 AWG to 2000 kcmil copper and 12 AWG to 2000 kcmil aluminum or copper-clad aluminum.

Types THHN, THWN, THWN-2 and THHW are certified in sizes 14 AWG to 1000 kcmil copper and 12 AWG to 1000 kcmil aluminum or copper-clad aluminum.

Types TA, TBS, PFA, PFAH and Z are certified in sizes 14 to 4/0 AWG copper and 12 to 4/0 AWG aluminum or copper-clad aluminum.

Types ZW, ZW-2, FEP and FEPB are certified in sizes 14 to 2 AWG copper and 12 to 2 AWG aluminum or copper-clad aluminum.

ADDITIONAL INFORMATION

For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 83, "Thermoplastic-insulated Wires and Cables."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Thermoplastic-insulated wire that contains copper or copper-clad aluminum conductors has the product name "Insulated Wire"; thermoplastic-insulated wire that contains aluminum conductors has the product name "Insulated Aluminum Wire."

Thermoplastic-insulated Wire (ZLGR)—Continued

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UNDERGROUND LOW-ENERGY CIRCUIT CABLE (ZLIA)**USE**

This category covers single- and multiple-conductor cable intended for direct burial in accordance with ANSI/NFPA 70, "National Electrical Code." The wire is rated 30 V or 150 V and 60°C.

PRODUCT MARKINGS

The wire is marked with the Listee's name, trade name or file number.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1493, "Outline of Investigation for Underground Low-Energy Circuit Cable."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Underground Low-energy Circuit Cable."

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WELDING CABLE (ZMAY)**GENERAL**

This category covers welding cable, which is a single-conductor cable intended for use in the secondary circuit of electric welders in accordance with Article 630, Part IV of ANSI/NFPA 70, "National Electrical Code." The conductors are flexible-stranded copper, 8 AWG through 500 kcmil, the individual strands of which are 34 through 30 AWG.

RATINGS

Welding cable is rated 60, 75 or 90°C and 100 or 600 V.

PRODUCT MARKINGS

The voltage and temperature ratings, if higher than 100 V and 60°C, respectively, are identified by printing on the surface of the insulation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1276, "Outline of Investigation for Welding Cable."

UL MARK

The UL symbol on the product and the Listing Mark of UL on the attached tag, the coil, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Welding Cable."

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WIRE, SPECIAL PURPOSE (ZMHX)**GENERAL**

This category covers different wire and cable products, each intended for the particular application marked on the product, tag, carton or reel.

Included in this category are:

Aircraft Ground Support Cable

Wire, Special Purpose (ZMHX)—Continued

Battery Lead Wire
 Brake Control Cable
 Burglar Alarm Cable
 Cathodic-protection Cable
 Crane and Hoist Optical Fiber Cable
 DLO Cable
 Flexible Power Feed Cable
 Golf Course Sprinkler System Wire
 Induction Heating Cable
 Inductive Detector Lead-in Cable
 Insulated Grounding Conductors
 Irrigation Machine Feeder Cable
 Low-ohmic Distribution Cable
 Litz Wire
 Marine Cable
 Mine Power Feeder Cable
 Mineral-insulated Metal-sheathed Control Cable
 Pendant Cable
 PVC-jacketed, Thermoplastic Polyolefin-jacketed and Thermoplastic
 CPE-jacketed Thermoset-insulated Wire
 Railroad Underground Power Cable
 RF Coaxial Cable
 SAE Wire Types TWP, GPT, HDT, TXL, GXL and SXL
 Satellite Antenna-Cable
 Shore Power Cable
 Slotted Coaxial Cable
 Solar Panel Wire
 Strobe Flash-head Cable
 Submersible Pump Cable (TPE or PE insulation)
 Surge Protection Cable
 Telephone Central Office Power Cable
 Tower and Case Wire
 Tracer Wire
 Track Wire
 Traction Power Cable
 Undercarpet Data Cable
 Underground Low-energy-circuit Cable
 Underground Signal Cable
 Vault Lacing Cable
 Wireless Antenna Interface Cable

PRODUCT MARKINGS

Information regarding installation, ampacity, etc., where appropriate, is included in the marking found on the tag, reel or carton.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are:

ANSI/UL 44, "Thermoset-Insulated Wires and Cables"
 ANSI/UL 62, "Flexible Cords and Cables"
 ANSI/UL 66, "Fixture Wire"
 ANSI/UL 83, "Thermoplastic-Insulated Wires and Cables"
 ANSI/UL 493, "Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables"
 ANSI/UL 854, "Service-Entrance Cables"
 ANSI/UL 1072, "Medium-Voltage Power Cables"
 UL 1309, "Marine Shipboard Cable"
 ANSI/UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords"
 SAE 1128, "Surface Vehicle Standard"

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product identifier, such as "Tracer Wire." The term "Special Purpose Wire" is not used.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIRE CONNECTORS (ZMKQ)**CRIMP TOOLS CLASSIFIED FOR USE WITH SPECIFIED WIRE CONNECTORS (ZMLS)****USE**

This category covers crimp tools suitable for use with specific certified Grounding and Bonding Equipment (KDER), Electrical Quick-connect Terminals (RFVW), Wire Connectors and Soldering Lugs (ZMVV) and Wire-connector Adapters (ZMOW) in accordance with the Certification Mark and a compatibility list provided with the tool.

The inside cover of the tool storage case or a permanently attached label to the tool itself contains a compatibility list that tabulates the company name and catalog number of the crimp tool and the company name, catalog number, wire size and number of crimps of the applicable certified grounding and bonding connectors, quick-connect terminals, wire connectors and wire-connector adapters for which the crimp tool has been investigated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 1976, "Outline of Investigation for Crimp Tools for Use with Wire Connectors."

UL MARK

The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

CRIMP TOOL

FOR USE WITH UL LISTED GROUNDING AND BONDING CONNECTORS,

QUICK CONNECT TERMINALS, WIRE CONNECTORS AND/OR WIRE CONNECTOR ADAPTERS IDENTIFIED IN THE INSTRUCTIONS PROVIDED

Control No.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

MULTI-POLE SPLICING WIRE CONNECTORS (ZMNA)**USE AND INSTALLATION**

This category covers insulated multi-pole mating and nonmating splicing wire connectors intended for field wiring and factory wiring. Multi-pole splicing wire connectors are intended to facilitate the connection of hard-wired utilization equipment (e.g., prefabricated wiring assemblies, ceiling fans, smoke detectors, lighting products) to the branch-circuit conductors of buildings. They are multi-polarity devices used to connect to two or more branch-circuit conductors.

This category also covers luminaire disconnects, which are intended to be used:

1. internal to luminaires to facilitate replacement of the ballast, or
2. for LED retrofit applications.

Luminaire disconnects are not intended to be directly attached to the branch-circuit conductors for the purpose of interrupting (making and breaking) branch circuits other than those for the luminaire associated with the disconnect. Luminaire disconnects may have one or more conductors per contact.

Mating connectors consist of two separable mating members (usually consisting of a male/female connection) that can be readily engaged or disengaged without the use of tools. They are provided with a latching mechanism and are physically keyed to maintain correct polarity. Luminaire disconnects need not be provided with a latch or locking mechanism, and have not been investigated as latching- or locking-type devices.

Nonmating connectors are single devices used to facilitate the direct connection to the branch-circuit conductors.

Multi-pole splicing wire connectors are not intended to be permanently mounted. They are floating in an outlet, junction box or within a piece of equipment, such as a luminaire.

These wire connectors are suitable for currents not exceeding the ampacity of insulated conductors or the rated ampacity of the connector.

These wire connectors are intended for use in installations covered by ANSI/NFPA 70, "National Electrical Code."

Multi-pole Splicing Wire Connectors (ZMNA)—Continued

Reusability — These connectors have not been investigated for reusability, except for spring-action-type connectors without the one-time-use-only marking.

Make and break — These wire connectors have been subjected to 10 operations of making and breaking 150% of current.

Box fill — These wire connectors have not been investigated for volume (box fill) and their acceptance in this capacity should be determined by the Authority Having Jurisdiction.

Use of specific tools — A specific tool and die used to assemble a multi-pole splicing wire connector to a conductor is identified on the connector, or on or within the unit container of the connector. The identification consists of a catalog or type designation, color coding, die index number, or equivalent means.

Multiple crimping operations — The number of crimps necessary to make a connection using the specific tool is identified on the connector, or on or within the unit container of the connector. Absence of information implies a single crimp.

Conductor strip length — Multi-pole splicing wire connectors requiring a specific strip length have this information identified on the connector, or on or within the unit container of the connector, on an insulating cover, or on the tool or tool-carrying case.

PRODUCT MARKINGS AND RATINGS

Wire size — Multi-pole splicing wire connectors are rated for copper conductors only. The wire size or wire range is marked on the connector, or on or within the unit container.

Multi-pole splicing wire connectors have not been investigated for use with aluminum conductors.

Multiple conductors — Multi-pole splicing wire connectors generally accommodate a single conductor under each clamping mechanism unless otherwise identified (e.g., the number of conductors located parenthetically in front of the wire size or range). Some connectors may have a single-conductor wire range as well as a second multiple-conductor wire range.

Wire stranding — Unless clearly marked "Solid," "SOL," "Stranded" or "STR" for a given wire size, wire range or wire combination, conductors in the range 10–30 AWG are both solid and stranded, and 6–8 AWG are for stranded wire only.

Stranded conductor Class — Multi-pole splicing wire connectors are rated for use with stranded Class B concentric, Class B compressed, and Class C concentric copper conductors.

Strip length — Multi-pole splicing wire connectors are marked with an insulation strip length for the conductor before assembly to the wire connector.

Conductor material — Multi-pole splicing wire connectors are marked "CU" or "Copper Wire Only."

Ampacity level — Other than luminaire disconnects, multi-pole splicing wire connectors are suitable for currents not exceeding the ampacity of insulated conductors rated 90°C. Use of higher-temperature-rated conductors is permitted, provided the ampacity levels continue to be based on the 90°C ratings.

Assigned ampere rating — A luminaire disconnect is marked with its assigned ampere rating.

Luminaire disconnect — Multi-pole splicing wire connectors are intended to hot disconnect a ballast within a luminaire and are marked "Luminaire Disconnect."

Insulation temperature rating (maximum operating temperature) — Insulated multi-pole splicing wire connectors are marked with an insulation temperature rating. Insulated connectors, insulating caps and insulating covers that have an insulation temperature greater than the connector ampacity level are marked "Temperature Rating of Insulating Material °C."

Voltage rating — Insulated multi-pole splicing wire connectors are marked with a voltage rating on the device or the unit container.

Flammability rating — Insulated multi-pole splicing wire connectors may be additionally marked with a flammability rating of V-2, V-1, V-0, VTM-2, VTM-1 or VTM-0.

Assigned torque rating — Multi-pole splicing wire connectors may be marked with an assigned torque value for which the connector was investigated.

Circuit identification — Unless provided with color-coded integral lead wires, multi-pole splicing wire connectors are marked to identify each terminal with the intended conductor polarity (e.g., G, B, W, L1, L2). Color-coded integral lead wires may also be used for circuit identification. The ground terminal, if provided, is marked with the international symbol for ground or with "G," "GR," "GND," "Ground," "Grounding," or similar marking. An integral lead wire for grounding is color-coded green.

One-time use — Multi-pole splicing wire connectors employing spring-action-type terminations and intended for one-time use only are marked "One-Time Use Only - Do Not Reuse," or the equivalent.

Limited current interruption — Mating-type multi-pole splicing wire connectors are marked "Limited Number of Current Interrupting Operations,"

Multi-pole Splicing Wire Connectors (ZMNA)—Continued

or the equivalent, to identify that the device has been investigated for a maximum of 10 make-and-break current operations.

Installation instructions — Multi-pole splicing wire connectors are marked "To be sold only with installation instructions."

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 2459, "Insulated Multi-Pole Splicing Wire Connectors."

UL MARK

The Listing Mark of UL on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Multi-Pole Splicing Wire Connector" or "Luminaire Disconnect," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIRE-CONNECTOR ADAPTERS (ZMOW)

USE AND INSTALLATION

This category covers wire-connector adapters intended to be installed on the end of a conductor prior to its insertion and connection to certified wire connectors, or to connectors within certified equipment. Wire-connector adapters are used to transition between an aluminum conductor and another wire connector or piece of equipment rated for copper conductors only. Wire-connector adapters are also used to transition between a stranded conductor (copper or aluminum) to the solid pin on the adapter, essentially converting a stranded conductor to a solid conductor.

Wire-connector adapters may be uninsulated, supplied with integral insulation, or have separable insulation in the form of insulating caps or covers.

Wire-connector adapters are intended for use in installations covered by ANSI/NFPA 70, "National Electrical Code," and intended to be installed using the prescribed manufacturer's installation instructions and specified crimp tool.

PRODUCT MARKINGS AND RATINGS

Wire size — Wire-connector adapters are rated for 30 AWG or larger copper conductors and/or 12 AWG or larger aluminum conductors. The wire size is marked on the adapter, or on or within the unit container.

Single conductors — Wire-connector adapters accommodate a single conductor, unless otherwise noted in the installation instructions.

Wire stranding — Wire-connector adapters are for stranded wire only.

Stranded conductor Class — Wire-connector adapters are intended for use on the following strand configurations:

- Aluminum - Class B concentric, compressed, and unidirectional lay compact

- Copper - Class B concentric or compressed, and Class C concentric

Wire-connector adapters additionally rated for use with compact copper conductors are additionally marked "For compact-stranded copper conductors" or equivalent on the wire-connector adapter, or on or within the unit container.

Wire-connector adapters additionally rated for use with other Class conductors, such as Class M, are marked with the additional class designation and number of strands.

Strip length — Some wire-connector adapters or their unit containers are marked with a strip length for the conductor before assembly to the wire-connector adapter.

Conductor material — Wire-connector adapters or the unit containers are marked with the type of conductor material(s) as follows:

Marking (or equivalent)	For Use With
"CU"	Copper wire only
"AL"	Aluminum wire only
"AL-CU" or "CU-AL"	Copper or aluminum

Ampacity level rating:

- A. **Equipment use** — Equipment wiring requirements may restrict the sizing, ampacity and temperature ratings of connected conductors. Equipment requirements may limit 90°C or higher-rated conductors to 60 or 75°C ampacity in accordance with Electrical Equipment for Use in Ordinary Locations (AALZ).
- B. **General use** — Wire-connector adapters rated 75°C are intended for

Wire-connector Adapters (ZMOW)—Continued

use at ampacities not greater than those for 75°C-rated conductors, and wire-connector adapters rated 90°C are for use at ampacities not greater than those for 90°C-rated conductors. Wire-connector adapters may be marked with “75C” or “90C” to represent these levels. Alternatively, these rating levels may be represented by a 7 or 9 associated with the marking “CU,” “AL” or “AL-CU,” e.g., “AL9,” “AL9CU,” “AL7CU,” “CU7,” “CU9.” Wire-connector adapters not marked with an ampacity number 7 or 9 have an assumed level per the following table. Use of higher-temperature-rated conductors is not prohibited, provided the ampacity levels continue to be based on the 75 or 90°C ratings.

Wire-connector adapters are rated and marked as follows:

Type of Wire-connector Adapter	Rated For	Wire Range	Temp Marking	Rating
Copper body	CU only	All	Need not be marked	90
Aluminum body	CU only	All	75 or 90	As marked@
Aluminum body	AL or AL-CU	All	75 or 90	As marked@

@ Wire-connector adapters rated for 6 AWG or smaller conductors may have the markings on the adapter, the unit container, or on an information sheet packed in the unit container.

Insulation temperature rating (maximum operating temperature) — Insulated wire-connector adapters, insulating caps and insulating covers have an insulation temperature rating marked on the device or the unit container. This rating does not exceed the 75 or 90°C temperature rating of the wire-connector adapter.

Voltage rating — Uninsulated wire-connector adapters are rated for general use in circuits up through 2000 V. Uninsulated wire-connector adapters may be used in circuits over 2000 V up through 35,000 V where the effects of corona have been investigated in the end-use application. Uninsulated wire-connector adapters are not marked with a voltage rating.

Insulated wire-connector adapters, insulating caps and insulating covers have voltage ratings for which they have been found acceptable. The voltage rating is marked on the device or the unit container and may be stated as “300 volts maximum” or “600 volts maximum,” or equivalent wording.

Flammability rating — Insulated wire-connector adapters and insulating caps and covers may be additionally marked with a flammability rating of V-0, V-1, V-2, VTM-0, VTM-1, or VTM-2.

Insulating caps and covers — Wire-connector adapters or the unit container are marked with the catalog number of the insulating caps and covers for which they are intended.

INSTALLATION INSTRUCTIONS

Use of specific tools — A specific tool and die used to assemble a wire-connector adapter to a conductor is identified on the wire-connector adapter, or on or within the unit container of the wire-connector adapter. The identification consists of a catalog or type designation, color-coding, die index number, or equivalent means. Color-coding of the crimp barrel is common.

Multiple crimping operations — The number of crimps necessary to make a connection using the specific tool is identified on the wire-connector adapter, or on or within the unit container of the wire-connector adapter. Location and number of crimping points is commonly located on the crimp barrel of the wire-connector adapter.

Conductor strip length — Wire-connector adapters requiring a specific strip length have this information identified on the wire-connector adapter, on or within the unit container of the wire-connector adapter, on an insulating cover, or on the tool or tool-carrying case. Strip-length marking is optional for some constructions.

Preliminary preparation of conductor — Some wire-connector adapters supply instructions for the preliminary preparation of conductors, such as use of conductor termination compound (antioxidant compound), on or within the unit container.

Conductor termination compound — Some wire-connector adapters are shipped pre-filled with conductor termination compound (antioxidant compound). For non-pre-filled wire-connector adapters, conductor termination compound may be used if recommended by the wire-connector adapter manufacturer as preliminary preparation of the conductor. Wire brushing of the conductor may also be performed if recommended. Also see Conductor Termination Compounds (DVYW).

RELATED PRODUCTS

See Wire Connectors and Soldering Lugs (ZMVV) for additional information on wire connectors used in conjunction with the termination of wire-connector adapters.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 486A-486B, “Wire Connectors.”

Wire-connector Adapters (ZMOW)—Continued

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Wire Connector Adapter.”

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WIRE CONNECTORS AND SOLDERING LUGS (ZMVV)

USE

This category covers single-polarity wire connectors for use with all alloys of copper, aluminum, or copper-clad aluminum conductors, or all three, for the purpose of providing contact between current-carrying parts. Wire connectors may be uninsulated, supplied with integral insulation, or separable insulation in the form of insulating caps or covers.

Terminal connectors establish a connection between one or more conductors to a terminal plate or stud, or to any similar device by means of mechanical pressure. They are fixed in position.

Splicing wire connectors establish a connection between two or more conductors by means of mechanical pressure and are not intended to be permanently mounted. They are floating, such as a twist-on connector in an outlet box.

Insulating caps or covers are for general use when installed on specific connectors. Information covering use of the caps or cover on specific connectors appears on the unit containers in which the caps or covers are packaged.

Soldering lugs are terminal connectors designed for attachment to a conductor by means of solder (nonpressure).

Reusability — Wire connectors have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction.

Direct burial — Wire connectors have not been investigated for direct burial. See **RELATED PRODUCTS**.

Use in service equipment — Where wire connectors are used as a part of service equipment, dead-front switchboards, panelboards, meter sockets, enclosed switches, circuit breakers, etc., reference should be made to the General Information for those categories concerning the use of the wire connectors. When wire connectors suitable for use with aluminum or copper-clad aluminum conductors are employed in such equipment, the suitability for wiring with aluminum or copper-clad aluminum conductors of such equipment will be indicated by a marking on the equipment and is independent of any marking on the wire connector.

INSTALLATION

Wire connectors are intended for use in installations covered by ANSI/NFPA 70, “National Electrical Code” (NEC), and should be installed using the prescribed manufacturer’s installation instructions.

Stacking of connectors (multiple connectors assembled using a single bolt, nut and washers) may be permitted where mechanical interference is reduced or eliminated with the use of offset tangs, stacking adapters, and the like. The surface contact area of the mounting tang should make complete contact with the mounting surface or the previously stacked connector tang.

PRODUCT MARKINGS AND RATINGS

Wire size and wire combinations — Wire connectors are rated for 30 AWG or larger copper conductors and/or 12 AWG or larger aluminum or copper-clad aluminum conductors. The wire size, wire range or wire combinations are marked on the connector, or on or within the unit container. Wire connectors additionally investigated for metric-size conductors are marked with the metric wire sizes expressed in mm².

Multiple conductors — Connectors generally accommodate a single conductor under a clamping mechanism unless otherwise identified, such as with the number of conductors located parenthetically in front of the wire size or range. Some connectors may have a single-conductor wire range as well as a second multiple-conductor wire range. Some connectors, such as twist-on connectors, will have multiple conductors expressed in a list of wire combinations.

Parallel conductors — Connectors intended for paralleling of conductors are intended to be used in accordance with Clause 310.4 of the NEC. Parallel connectors may have multiple-conductor clamping mechanisms, each accepting a single conductor or a singular clamping mechanism accepting multiple conductors.

Wire stranding — Unless clearly marked “Solid,” “SOL,” “Stranded” or “STR” for a given wire size, wire range or wire combination, conductors

Wire Connectors and Soldering Lugs (ZMVV)—Continued

in the range 30-10 AWG are both solid and stranded, and 8 AWG and larger are for stranded wire only. Connectors additionally rated for metric conductor sizes may be marked with the letter “r” for rigid solid and rigid stranded conductors, or the letter “f” for flexible conductors.

Stranded conductor Class — Connectors rated for use with stranded conductors are for the following strand configurations:

- Aluminum – Class B concentric, compressed or compact, and SIW (single input wire)
- Copper-clad aluminum – Class B concentric or compressed, and Class C concentric
- Copper – Class B concentric or compressed, and Class C concentric

Wire connectors additionally rated for use with compact copper conductors are additionally marked “For compact-stranded copper conductors” or equivalent on the connector, or on or within the unit container.

Wire connectors additionally rated for use with other Class conductors, such as Class M, are marked with the additional class designation and number of strands.

Strip length — Some connectors or their unit containers are marked with a strip length for the conductor before assembly to the wire connector.

Conductor material — Wire connectors or the unit containers are marked with the type of conductor material(s) as follows:

Marking (or equivalent)	For Use With
“CU”	Copper wire only
“AL”	Aluminum wire only
“AL-CU” or “CU-AL”	Copper to copper, aluminum to aluminum, copper to aluminum but not intermixed or in direct physical contact, copper-clad aluminum to copper-clad aluminum, copper to copper-clad aluminum, aluminum to copper-clad aluminum but not intermixed or in direct physical contact
“AL-CU (intermixed – dry locations)”	Copper to copper, aluminum to aluminum, copper to aluminum intermixed and in direct physical contact, copper-clad aluminum to copper-clad aluminum, copper to copper-clad aluminum, aluminum to copper-clad aluminum and in direct physical contact

Except as otherwise noted on or in the shipping carton, aluminum conductors are not intended to be used in direct physical contact with copper and copper-clad aluminum conductors in the same connector. A wire connector for securing an aluminum wire in combination with a copper or copper-clad aluminum conductor, where physical contact occurs between the wires of different metals, is limited to dry locations only and is marked “AL-CU (intermixed – dry locations).”

Ampacity level rating:

- A. **Equipment use** — Equipment wiring requirements may restrict the sizing, ampacity and temperature ratings of connected conductors. Equipment requirements may limit 90°C or higher-rated conductors to 60 or 75°C ampacity in accordance with Electrical Equipment for Use in Ordinary Locations (AALZ).
- B. **General use** — Connectors rated 75°C are intended for use at ampacities not greater than those for 75°C-rated conductors, and connectors rated 90°C are for use at ampacities not greater than those for 90°C-rated conductors. Connectors may be marked with “75C” or “90C” to represent these levels. Alternatively, these rating levels may be represented by a 7 or 9 associated with the marking “CU,” “AL” or “AL-CU,” e.g., “AL9,” “AL9CU,” “AL7CU,” “CU7,” “CU9.” Connectors not marked with an ampacity number 7 or 9 have an assumed level per the following table. Use of higher-temperature-rated conductors is not prohibited, provided the ampacity levels continue to be based on the 75 or 90°C ratings.

Connectors are rated and marked as follows:

Type of Connector	Rated For	Wire Range	Temp Marking	Rating
Terminal (CU body)	CU only	All	Not marked	90
Terminal (AL body)	CU only	All	75 or 90	As marked@
Terminal	AL or AL-CU	All	75 or 90	As marked@
Splicing wire	CU only	30-6	Not marked	90
Splicing wire (CU body)	CU only	4 and larger	Not marked	90
Splicing wire (AL body)	CU only	4 and larger	75 or 90	As marked
Splicing wire	AL or AL-CU	30-6	Not marked	75
Splicing wire	AL or AL-CU	4 and larger	75 or 90	As marked

Wire Connectors and Soldering Lugs (ZMVV)—Continued

@ Terminal connectors rated for 6 AWG or smaller conductors may have the markings on the connector, the unit container, or on an information sheet packed in the unit container.

Insulation temperature rating (maximum operating temperature) — Insulated connectors, insulating caps and insulating covers have an insulation temperature rating marked on the device or the unit container. Insulated connectors, insulating caps and insulating covers that have an insulation temperature greater than the connector ampacity level rating are marked “Temperature Rating of Insulating Material ___°C.”

Voltage rating — Uninsulated wire connectors are rated for general use in circuits up through 2000 V. Uninsulated wire connectors may be used in circuits over 2000 V up through 35,000 V where the effects of corona have been investigated in the end-use application. Uninsulated wire connectors are not marked with a voltage rating.

Insulated wire connectors, insulating caps and insulating covers have voltage ratings for which they have been found acceptable. The voltage rating is marked on the device or the unit container and may be stated as “300 volts maximum,” “600 volts maximum,” or “600 volts maximum building wire, 1000 volts maximum, in signs or luminaires,” or equivalent wording.

Flammability rating — Insulated connectors and insulating caps and covers may be additionally marked with a flammability rating of V-2 or VTM-2 or better.

Assigned torque rating — A connector or its unit container may be marked with an assigned torque value for which the connector was investigated.

INSTALLATION INSTRUCTIONS

Use of specific tools — A specific tool and die used to assemble a wire connector to a conductor is identified on the connector, or on or within the unit container of the connector. The identification consists of a catalog or type designation, color-coding, die index number, or equivalent means. Color-coding of the crimp barrel is common.

Multiple crimping operations — The number of crimps necessary to make a connection using the specific tool is identified on the connector, or on or within the unit container of the connector. Location and number of crimping points is commonly located on the crimp barrel of the connector.

Conductor strip length — Wire connectors requiring a specific strip length have this information identified on the connector, on or within the unit container of the connector, on an insulating cover, or on the tool or tool-carrying case. Strip-length marking is optional for some constructions.

Preliminary preparation of conductor — Some wire connectors supply instructions for the preliminary preparation of conductors, such as use of conductor termination compound (antioxidant compound) or pre-twisting of conductors, on or within the unit container.

Pre-twisting — Some connectors may specify that conductors are to be pre-twisted before assembly onto the connector.

Conductor termination compound — Some connectors are shipped pre-filled with conductor termination compound (antioxidant compound). For non-pre-filled connectors, conductor termination compound may be used if recommended by the connector manufacturer as preliminary preparation of the conductor. Wire brushing of the conductor may also be performed if recommended. Also see Conductor Termination Compounds (DVYW).

RELATED PRODUCTS

Sealed wire-connector systems intended for direct burial, below-grade use, or similar damp or wet locations are covered under Sealed Wire-connector Systems (ZMWQ).

Wire-connector adapters installed on the end of a conductor prior to their subsequent connection to certified wire connectors or to connectors used in certified equipment are covered under Wire-connector Adapters (ZMOW).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 486A-486B, “Wire Connectors,” and ANSI/UL 486C, “Splicing Wire Connectors.”

UL MARK

The Listing Mark of UL on the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Wire Connector,” “Soldering Lug,” “Terminal Connector,” “Splicing Wire Connector,” or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss,

Wire Connectors and Soldering Lugs (ZMVV)—Continued

expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

SEALED WIRE-CONNECTOR SYSTEMS (ZMWQ)

USE AND INSTALLATION

This category covers sealed wire-connector systems intended for wet or damp locations and other installations, such as direct burial, below grade, or above grade where protected from direct exposure to sunlight. These systems may also be used indoors or in dry locations.

Sealed wire-connector systems are intended for use in installations covered by ANSI/NFPA 70, "National Electrical Code."

Sealed wire-connector systems have not been investigated for direct exposure to sunlight. Additional performance considerations to show equivalency to the connected conductors should be considered for UV exposure.

This category covers a complete system or insulating caps, covers, resins, tubing and tapes that are part of the system for use with specific wire connectors where the seal is made at the conductor. Pressure wire connectors may or may not be provided with the system.

CONDUCTOR TYPES

Sealed wire-connector systems are intended for use with Types USE, RHW, XHHW, RW90 EP, RW90 XLPE or TWU, 30 AWG through 2000 kcmil copper or aluminum conductors with currents not exceeding the ampacity of insulated conductors rated either 75 or 90°C and intended for use at 600 V or less.

When so marked, sealed wire-connector systems may also be intended for use with conductors of single- or multiple-conductor underground feeder cable (Type UF), golf course sprinkler cable, underground low-energy cable, irrigation cable, or other cable with insulation acceptable for direct burial, below grade use, or wet locations.

PRODUCT MARKINGS AND RATINGS

Sealed wire-connector systems are marked with the following:

1. catalog number
2. wire range or wire combinations
3. voltage rating
4. operating temperature rating
5. the statement "For Use in Wet or Damp Locations"
6. special conductor types, if applicable

Sealed wire-connector systems are marked with the following:

1. all required wire-connector markings and assembly information (see ZMVV)
 2. complete assembly instructions for the sealed wire-connector system
- Sealed wire-connector systems not provided with a wire connector in the same unit container include a statement that the sealed wire-connector system is intended to be used only with certified wire connectors and are marked with one or more of the following:
1. the catalog number of the specific wire connector intended to be used
 2. the physical dimensions of a specific wire connector intended to be used, or
 3. the minimum and maximum envelope dimensions of any wire connector intended to be used

Some sealed wire-connector systems may additionally be marked "Direct Burial," "Raintight," "Watertight" or "Submersible," as applicable.

All markings are located on:

1. all parts that comprise the system,
2. the packaging carton,
3. the unit container, or
4. the information sheet provided in each unit container.

RELATED PRODUCTS

See Wire Connectors and Soldering Lugs (ZMVV) for additional information on wire connectors used within a sealed wire-connector system.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 486D, "Sealed Wire Connector Systems."

UL MARK

The Listing Mark of UL on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Sealed Wire Connector System."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for

Sealed Wire-connector Systems (ZMWQ)—Continued

any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIRE CONNECTORS AND SOLDERING LUGS CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (ZNKD)

USE

This category covers connecting devices used as separate entities for the connection of two or more electrical copper conductors, rigid (solid and stranded) or flexible, having a cross-sectional area of 0.2 mm² up to and including 35 mm² and equivalent AWG conductors with a rated voltage not exceeding 1 000 Vac up to and including 1000 Hz and 1500 V dc where electrical energy is used for household and similar purposes.

These products may also be provided with the Listing Mark for Wire Connectors and Soldering Lugs (ZMVV).

These products are intended for distribution and use in areas of the world where international standards are in effect.

REQUIREMENTS

The basic standard used to investigate products in this category is IEC 60998-1 (2002), "Connecting Devices for Low-Voltage Circuits for Household and Similar Purposes – Part 1: General Requirements," in addition to one of the following:

IEC 60998-2-1 (2002), "Connecting Devices for Low-Voltage Circuits for Household and Similar Purposes – Part 2-1: Particular Requirements for Connecting Devices as Separate Entities with Screw-Type Clamping Units"

IEC 60998-2-2 (2002), "Connecting Devices for Low-Voltage Circuits for Household and Similar Purposes – Part 2-2: Particular Requirements for Connecting Devices as Separate Entities with Screwless-Type Clamping Units"

IEC 60998-2-3 (2002), "Connecting Devices for Low-Voltage Circuits for Household and Similar Purposes – Part 2-3: Particular Requirements for Connecting Devices as Separate Entities with Insulation-Piercing Clamping Units"

IEC 60998-2-4 (2004), "Connecting Devices for Low-Voltage Circuits for Household and Similar Purposes – Part 2-4: Particular Requirements for Twist-On Connecting Devices"

UL MARK

The Classification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

* CONNECTING DEVICE
IN ACCORDANCE WITH IEC 60998-1 AND IEC 60998-2.**
Control No.

* SCREW-TYPE, SCREWLESS, INSULATION-PIERCING OR TWIST-ON

** 1, 2, 3 or 4

For those products which are also Listed, the Classification Mark includes the appropriate Listing Mark and the statement, "ALSO CLASSIFIED BY UNDERWRITERS LABORATORIES INC. IN ACCORDANCE WITH IEC 60998-1 AND IEC 60998-2.**"

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIRE, HEAT RESISTANT, FOR OVENS (ZNA)

USE

This category covers single- and multiple-conductor wire intended for use in dry locations in infrared ovens and similar other high-temperature applications. The wire is rated 300 or 600 V, and 105, 150, 200, 250, 350 or 450°C.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2563, "Outline of Investigation for Heat Resistant Wire."

UL MARK

The Listing Mark of UL on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Heat-resistant Wire."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIRED CABINETS (ZNXR)**USE AND INSTALLATION**

This category covers wired cabinets, such as illuminated and nonilluminated jewelry, display and showcases.

Wired cabinets may be permanently connected or cord-and-plug connected. Cord-and-plug-connected wired cabinets are limited to groups of not more than six sections coupled together by flexible cord and locking connectors, with one of the wired-cabinet sections connected by a flexible cord and plug cap rated 15 or 20 A to a permanently installed receptacle in the building structure.

Permanently wired cabinets may be provided with convenience outlets for connection of equipment, such as POS (point-of-sale) equipment. Cord-and-plug-connected wired cabinets may have receptacles installed for connection of factory-installed equipment, such as luminaires. These receptacles are not intended for powering additional equipment and are occupied by factory-installed equipment.

Wired cabinets may be divided into sections when of such size that shipment as one cabinet is impractical. Each major subassembly bears a "Wired Cabinet Section" Certification Mark. Each group of wired-cabinet sections are provided with installation instructions describing or illustrating the proper assembly and electrical connection of the sections when applicable.

These products are intended to be installed in accordance with ANSI/NFPA 70, "National Electrical Code."

RELATED PRODUCTS

Other commercial display cabinets are covered under Commercial Displays (IYMX).

Cabinets provided with or designed for use with refrigeration equipment are covered under Commercial Refrigerators and Freezers (SGKW).

Nonilluminated advertising displays are covered under Advertising Displays, Nonilluminated (AAVU).

Custom-built commercial products, such as ticket machines, electronic point-of-sale products, Internet communication stands, and the like are covered under Custom-built Kiosks (EMHH).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 65, "Wired Cabinets."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Wired Cabinet" or "Wired Cabinet Section ___ of ___" (the first blank identifies the number of the section, and the second blank identifies the total number of sections that constitute the complete wired cabinet).

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

POSITIONING DEVICES (ZODZ)**GENERAL**

This category covers cable ties, cable-tie mounts, and similar types of related hardware for field installation in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

The investigation of cable ties to ANSI/UL 62275, "Cable Management Systems - Cable Ties for Electrical Installations," generally includes flammability, installation, minimum and maximum operating temperature, minimum installation temperature, and mechanical property considerations. In addition, cable ties may also be investigated for smoke and heat generation, corrosion resistance, and weatherability characteristics as appropriate for the product.

The investigation of fixing devices (cable-tie mounts) to ANSI/UL 62275 generally includes flammability, minimum and maximum operating temperature, and mechanical property considerations. In addition, fixing devices may also be investigated for smoke and heat generation, corrosion resistance, and weatherability characteristics as appropriate for the product.

The investigation of devices to ANSI/UL 1565, "Positioning Devices," generally includes flammability, maximum operating temperature, and mechanical property considerations. In addition, such devices may also be investigated for smoke and heat generation, corrosion resistance, and weatherability characteristics as appropriate for the product.

RATINGS**Type Designations for Products Investigated to ANSI/UL 62275**

Type 2 — A Type 2 product retains 100% of its declared loop tensile strength (cable ties) or declared mechanical strength (fixing devices) after test conditions. The declared maximum operating temperature for products designated and marked as "Type 2" is based solely on performance criteria in ANSI/UL 62275. The polymeric material comprising the product has not been separately investigated for long-term thermal properties according to ANSI/UL 746B, "Polymeric Materials - Long Term Property Evaluations."

Type 21 — A Type 21 product retains 100% of its declared loop tensile strength (cable ties) or declared mechanical strength (fixing devices) after test conditions. The declared maximum operating temperature for products designated and marked as "Type 21" is limited to the Relative Thermal Index - Strength (RTI - Strength) at 1.5 mm (0.06 in.) thickness for the polymeric material that comprises the product. The RTI - Strength for the material is determined by separate investigation for long-term thermal properties according to ANSI/UL 746B, and the declared maximum operating temperature of the product is based on the performance criteria in ANSI/UL 62275.

Type 2S and Type 21S — Type 2S and Type 21S products meet the same requirements as Type 2 and Type 21 products, respectively, but have been additionally investigated for use as primary support for a flexible conduit, flexible tubing, or cable in accordance with the NEC. Such products may also be marked "Support" in lieu of the "S" designation.

Products investigated to ANSI/UL 1565

Load Rating — When a load rating is declared, the device retains the declared mechanical strength following test conditions.

Temperature Rating — The temperature rating of the device is limited to the RTI - Strength at 1.5 mm (0.06 in.) thickness for the polymeric material that comprises the product. The RTI - Strength for the material is determined by separate investigation for long-term thermal properties according to ANSI/UL 746B, and the declared maximum operating temperature of the product is based on the performance criteria in ANSI/UL 1565.

Limited Support — Products marked "Limited Support" are able to provide support for nonflexible conduit or tubing up to the maximum load rating marked on the device. The devices are not intended to provide primary support for nonflexible conduit or tubing at the maximum spacing intervals specified in the NEC.

MARKINGS

For cable ties investigated to ANSI/UL 62275, the product, the smallest unit container in which the product is packaged, or the installation instructions provided with the product are marked with the manufacturer's identifier (company name or registered trademark), catalog or model number, the product's maximum and minimum operating temperature, minimum installation temperature if below 0°C, minimum and maximum bundle diameter, loop tensile strength, and type designation in accordance with ANSI/UL 62275.

For separately supplied fixing devices investigated to ANSI/UL 62275, the product, the smallest unit container in which the product is packaged, or the installation instructions provided with the product are marked with the manufacturer's identifier (company name or registered trademark), catalog or model number, the product's maximum and minimum operating temperature, declared mechanical strength, and type designation in accordance with ANSI/UL 62275.

Fixing devices or cable ties having integral fixing devices investigated to ANSI/UL 62275 that are dependent on specific maximum and minimum mounting-hole size, panel thickness, mounting orientation, or other variables critical to proper installation include this information in their marking on the product, smallest unit container in which the product is packaged, or installation instructions provided with the product.

For devices investigated to ANSI/UL 1565, the product or the smallest unit container in which the product is packaged is marked with the product's maximum load and thermal ratings, together with the manufacturer's identifier (company name or registered trademark) and catalog or model number.

POSITIONING DEVICES (ZODZ)

Products covered under this category have not been investigated for outdoor use unless marked "Resistant to Ultraviolet Light," "For Use Outdoors," "For Use Outdoors or Indoors," or similar wording, in which case they have been found acceptable for both indoor and outdoor use.

All metallic products are suitable for use in air-handling areas and may be marked "Suitable for use in air handling spaces in accordance with Sec 300.22(B), (C) and (D) of the National Electrical Code," "AH-1," or equivalent wording, as appropriate. Such products comply with the requirements in ANSI/UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces."

All nonmetallic and composite products that have been investigated to determine their suitability for use in air-handling areas may be marked "Suitable for use in air handling spaces in accordance with Sec 300.22(C) and (D) of the National Electrical Code," "AH-2," or equivalent wording, as appropriate. Such products comply with the requirements in ANSI/UL 2043.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1565, "Positioning Devices," or ANSI/UL 62275, "Cable Management Systems - Cable Ties for Electrical Installations."

UL MARK

The Listing Mark of UL on the product, or on the smallest unit container in which the product is packaged with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Positioning Device" or "Cable Tie," or other appropriate product name as shown in the individual Listings.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIRE-PULLING COMPOUNDS (ZOKZ)

USE

This category covers wire-pulling compounds intended for use as lubricants in installing electrical wire and cable in conduit and other raceway. These compounds have been investigated to determine their compatibility with conductor insulation and coverings.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 267, "Outline of Investigation for Wire-Pulling Compounds."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up

WIRE-PULLING COMPOUNDS (ZOKZ)

Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Wire Pulling Compound."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

WIREWAY, AUXILIARY GUTTERS AND ASSOCIATED FITTINGS (ZOYX)

USE AND INSTALLATION

This category covers metallic and nonmetallic wireway, auxiliary gutters, and associated fittings for installation in accordance with Articles 366, 376, 378 and 645 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Metallic wireway installed in accordance with the product markings and manufacturer's instructions is suitable for use as equipment grounding conductors, and is certified for grounding.

PRODUCT MARKINGS

Products investigated to determine that they are rain tight are marked "Raintight."

Nonmetallic products investigated to determine their suitability for exposure to sunlight are marked "Sunlight Resistant."

Nonmetallic products investigated to determine their suitability for use in an air-handling space in a location subject to Article 645 of the NEC are so rated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate metallic products in this category is ANSI/UL 870, "Wireways, Auxiliary Gutters and Associated Fittings."

The basic standards used to investigate nonmetallic products in this category are ANSI/UL 870 and ANSI/UL 5A, "Nonmetallic Surface Raceways and Fittings."

UL MARK

The Listing Mark of UL on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Wireway or Auxiliary Gutter," "Wireway," "Auxiliary Gutter," "Wireway or Auxiliary Gutter Fittings," "Wireway Fittings" or "Auxiliary Gutter Fittings."

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

Index of UL Product Categories Correlated to the 2011 NEC®

The Index of UL Product Categories Correlated to the 2011 NEC is intended to act merely as a tool for the User to identify potential UL Product Category Codes and their location in this publication. Locating the Product Category Code on the pages indicated will provide the User with the UL Guide Information for the applicable Category Code. This Correlation Index may not be a comprehensive list. There may be other UL Product Categories for which Listed products are covered that may be applicable to the Code Section. The User should independently confirm the applicability of the Product Category to the Code Section and verify that no other UL Product Categories apply to the installation. The installation of products for the Categories identified in this index are subject to the approval by the Authority Having Jurisdiction (AHJ).

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240.50(C)	JEFV	214	240.100(A)(1)	NRGU	268
240.50(D)	DLBX	114	240.100(A)(2)	JEEG	219
240.50(D)	IZZR	211	240.101(A)	DLAH	111
240.50(D)	JAMZ	211	240.101(A)	JEEG	219
240.50(D)	JEFV	214	Article 250 - Grounding and Bonding		
240.51(A)	JEFV	214	250.8(A)	KDER	224
240.51(B)	JEFV	214	250.8(A)	ZMVV	495
240.52	IZZR	211	250.21	KDAX	224
240.52	JAMZ	211	250.52(A)(5)(B)	KDER	224
240.52	JEFV	214	250.52(A)(6)	KDER	224
240.53	JEFV	214	250.64(C)	KDER	224
240.53(A)	JEFV	214	250.64(D)(1)	KDER	224
240.53(B)	IZZR	211	250.64(D)(3)	KDER	224
240.53(B)	JAMZ	211	250.64(E)	KDER	224
240.53(B)	JEFV	214	250.64(F)(3)	KDER	224
240.54(A)	IZZR	211	250.64(F)(3)	ZMVV	495
240.54(A)	JAMZ	211	250.70	KDER	224
240.54(B)	IZZR	211	250.70	ZMVV	495
240.54(B)	JAMZ	211	250.92(B)(4)	KDER	224
240.54(B)	JEFV	214	250.94	KDER	224
240.54(C)	IZZR	211	250.97	BGUZ	80
240.54(C)	JAMZ	211	250.97	CYIV	98
240.54(D)	IZZR	211	250.97	DWTT	122
240.54(D)	JAMZ	211	250.97	PJOX	301

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250.97	QCIT	326	280.24(B)	VZQK	419
250.97	QEUY	332	Article 285 - Surge-Protective Devices (SPDs), 1 kV or less		
250.97	RJPR	370	285.1	DIMV	106
250.118(2)	DWTT	122	285.1	OWIW	292
250.118(2)	DYIX	125	285.1	VZCA	419
250.118(2)	DYWV	126	285.1	XUPD	469
250.118(3)	DWTT	122	285.3(2)	XUPD	469
250.118(3)	DYBY	125	285.5	DIMV	106
250.118(4)	DWTT	122	285.5	OWIW	292
250.118(4)	FJMX	151	285.5	VZCA	419
250.118(4)	FKAV	151	285.5	XUPD	469
250.118(5)	DWTT	122	Article 300 - Wiring Methods		
250.118(5)	DXUZ	125	300.1(B)	AALZ	50
250.118(6)	DWTT	122	300.1(B)	NJAV	260
250.118(6)	DXHR	124	300.1(B)	NJOT	262
250.118(7)	ILJW	201	300.1(B)	PRGY	308
250.118(7)	ILNR	201	300.3(B)(3)	PJAZ	301
250.118(8)	AWEZ	72	300.3(B)(3)	PPKV	306
250.118(8)	AWSX	73	300.3(B)(4)	BGUZ	80
250.118(8)	DWTT	122	300.3(B)(4)	QEUY	332
250.118(9)	PPKV	306	300.3(B)(4)	ZOYX	499
250.118(9)	PPYT	306	300.4(A)(1)	DWMU	122
250.118(10)	PJAZ	301	300.4(A)(2)	DWMU	122
250.118(10)	PJOX	301	300.4(B)(1)	DWMU	122
250.118(10)	PJPP	302	300.4(B)(2)	DWMU	122
250.118(11)	CYNW	101	300.4(D)	DWMU	122
250.118(13)	ZOYX	499	300.4(E)	DWMU	122
250.118(14)	RJBT	369	300.4(F)	DWMU	122
250.118(14)	RJPR	370	300.4(F)	QCRV	329
250.119 EXC.	DUZX	119	300.4(G)	DWTT	122
250.119 EXC.	HNIR	178	300.4(G)	QCRV	329
250.119 EXC.	QPTZ	355	300.4(H)	DWTT	122
250.120 (A) INF. NOTE	FHIT	150	300.5(B)	ZMWQ	497
250.122(D)(2)	DIVQ	107	300.5(C) EXC 1	PPKV	306
250.122(D)(2)	NKJH	264	300.5(C) EXC 2	PJAZ	301
250.124(A)	AXGV	73	300.5(D)(4)	DYBY	125
250.124(A)	AYIR	75	300.5(D)(4)	DYIX	125
250.124(A)	AYVZ	75	300.5(D)(4)	DYWV	126
250.124(A)	QLHN	345	300.5(D)(4)	DZYR	127
250.124(A)	RTRT	375	300.5(E)	ZMWQ	497
250.146(A)	EOYX	141	300.5(H)	QCRV	329
250.146(A)	QCIT	326	300.5(K)	DYIX	125
250.146(A)	RTRT	375	300.5(K)	DZLR	127
250.146(A)	WJQR	436	300.5(K)	DZYR	127
250.146(B)	EOYX	141	300.6(A)	AALZ	50
250.146(B)	RTRT	375	300.6(A)	FOIZ	155
250.146(B)	WJQR	436	300.7(B)	DWTT	122
250.146(C)	QCIT	326	300.11(A)	DWMU	122
250.146(D)	RTRT	375	300.11(A)	ZODZ	498
250.148(C)	BGUZ	80	300.11(A)(1)	BXUV	84
250.148(C)	KDER	224	300.11(A)(1)	DWMU	122
250.148(C)	QCIT	326	300.11(A)(2)	DWMU	122
250.182	KDZC	226	300.11(B)	DWMU	122
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300.15(A)	RJTX	370	300.22(C)(1)	PPKV	306
300.15(A)	ZOYX	499	300.22(C)(1)	PWIP	317
300.15(D)	PPYT	306	300.22(C)(1)	QAYK	320
300.15(E)	RTRT	375	300.22(C)(1)	QPTZ	355
300.15(E)	WJQR	436	300.22(C)(1)	QQVX	358
300.15(F)	RTRT	375	300.22(C)(1)	RJBT	369
300.15(G)	ZMWQ	497	300.22(C)(1)	ZOYX	499
300.15(H)	QAAV	318	300.22(C)(2)	CYNW	101
300.15(L)	BGHL	80	300.22(C)(3)	AZJX	75
300.16(A)	BGUZ	80	300.22(C)(3)	AZSQ	76
300.16(A)	DWTT	122	300.22(C)(3)	BHZF	82
300.16(A)	QCIT	326	300.22(C)(3)	CEYY	95
300.16(A)	QCMZ	328	300.22(C)(3)	DUXR	118
300.16(B)	DWTT	122	300.22(C)(3)	EIMZ	131
300.16(B)	QCRV	329	300.22(C)(3)	FKVS	153
300.19(A)	QCRV	329	300.22(C)(3)	NWGQ	277
300.19(B)	FHIT	150	300.22(C)(3)	QBWY	326
300.19(C)(1)	DWMU	122	300.22(C)(3)	QBWY	326
300.19(C)(1)	QCRV	329	300.22(C)(3)	UEAY	406
300.19(C)(1)	ZODZ	498	300.22(C)(3)	UUMW	395
300.19(C)(2)	BGUZ	80	300.22(C)(3)	WYQQ	448
300.19(C)(2)	QCIT	326	300.22(C)(3)	XABE	451
300.19(C)(2)	QCMZ	328	300.22(C)(3)	XHLY	460
300.19(C)(3)	DWMU	122	300.37	CVZW	97
300.19(C)(3)	QCIT	326	300.37	CYNW	101
300.19(C)(3)	QCMZ	328	300.37	CYOV	101
300.19(C)(3)	ZODZ	498	300.37	DYBY	125
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300.21	CEYY	95	300.37	DYWV	126
300.21	CLIV	96	300.37	DZKT	126
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300.21	QCSN	329	300.37	PITY	300
300.21	XHEZ	458	300.37	PIVW	300
300.21	XHLY	460	300.37	PJAZ	301
300.22(B)	BHZF	82	300.37	ZOYX	499
300.22(B)	DXHR	124	300.50(A)(1)	PJAZ	301
300.22(B)	DXUZ	125	300.50(A)(2)	DYIX	125
300.22(B)	DYBY	125	300.50(A)(2)	DZLR	127
300.22(B)	DYIX	125	300.50(A)(2)	DZYR	127
300.22(B)	DYWV	126	300.50(C)	DYBY	125
300.22(B)	FJMX	151	300.50(C)	DYWV	126
300.22(B)	ILJW	201	300.50(C)	DZKT	126
300.22(B)	PJAZ	301	300.50(C)	DZYR	127
300.22(B)	PPKV	306	300.50(D)	ZMWQ	497
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300.22(C)(1)	DVCS	121	310.10(C)(2)	ZKHZ	489
300.22(C)(1)	DXUZ	125	310.10(C)(2)	ZKST	490
300.22(C)(1)	DYBY	125	310.10(C)(2)	ZLGR	491
300.22(C)(1)	DYIX	125	310.10(C)(3)	PPKV	306
300.22(C)(1)	DYWV	126	310.10(E) EXC. 1	PITY	300
300.22(C)(1)	FJMX	151	310.10(E)	PJAZ	301
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310.15(B)	ZLGR	491		314.1	BGUZ	80
310.15(B)(1)	PPKV	306		314.1	DWTT	122
310.15(B)(1)	TYLZ	404		314.1	QBWY	326
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310.15(B)(1)	ZKHZ	489		314.1	QCIT	326
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310.60(A)	DYBY	125		314.1	WCEZ	425
310.60(A)	DYIX	125		314.3	QCMZ	328
310.60(A)	DYWV	126		314.15	BGHL	80
310.60(A)	DZKT	126		314.15	BGUZ	80
310.60(A)	DZLR	127		314.15	DWTT	122
310.60(A)	DZYR	127		314.15	QCIT	326
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310.104	PPKV	306		314.16(C)(1)	DWTT	122
310.104	TYLZ	404	314.16(C)(1)	QCIT	326	
310.104	YDUX	472	314.16(C)(1)	QCKW	328	
310.104	ZKHZ	489	314.16(C)(1)	QCMZ	328	
310.104	ZKST	490	314.16(C)(2)	QCIT	326	
310.104	ZLGR	491	314.16(C)(2)	QCKW	328	
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310.106(B)	ZKST	490	314.16(C)(3)	DWTT	122	
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312.1	PJXS	304	314.19	QCMZ	328	
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312.2	AALZ	50	314.20	QCMZ	328	
312.2	DWTT	122	314.22	QCIT	326	
312.2	FKAV	151	314.22	QCMZ	328	
312.5	CYIV	98	314.23(G)	BGUZ	80	
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312.5	PJXS	304	314.23(H)(1)	ZJCZ	487	
312.5	PJYZ	304	314.25(A)	QCIT	326	
312.5(A)	QCRV	329	314.25(A)	QCMZ	328	
312.5(B)	DWTT	122	314.25(C)	QCRV	329	
312.5(B)	QCRV	329	314.27(A)(1)	QBWY	326	
312.5(C)	QCRV	329	314.27(A)(1)	QBWY	326	
312.8	DIVQ	107	314.27(A)(1)	QCIT	326	
312.8	QEUY	332	314.27(A)(2)	QCMZ	328	
312.8	WGEU	429	314.27(A)(2)	QBWY	326	
312.8	WIAX	432	314.27(A)(2)	QBWY	326	
312.8	WJAZ	435	314.27(A)(2)	QCIT	326	
312.10	CYIV	98	314.27(A)(2)	QCMZ	328	
312.10	PJYZ	304	314.27(B)	QBWY	326	
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314.27(D)	QCIT	326	324.18	IKMW	200
314.27(D)	QCMZ	328	324.40(A)	IKMW	200
314.28	BGUZ	80	324.40(C)(1)	IKMW	200
314.28	DWTT	122	324.40(C)(2)	IKMW	200
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314.28	QCIT	326	324.42(A)	IKMW	200
314.28	QCMZ	328	324.42(B)	IKMW	200
314.28(C)	BGUZ	80	324.56(A)	IKMW	200
314.28(C)	DWTT	122	324.56(B)	IKMW	200
314.28(C)	QBWY	326	324.100(A)	IKKT	200
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314.28(C)	QCIT	326	328.1	PITY	300
314.28(C)	QCMZ	328	328.2	PITY	300
314.28(E)(1)	QPQS	352	328.10(3)	PITY	300
314.29	BGHL	80	328.10(3)	PJAZ	301
314.29	BGUZ	80	328.10(6)	PITY	300
314.29	QCIT	326	328.10(6)	PJAZ	301
314.29	QCMZ	328	Article 330 - Metal-Clad Cable: Type MC		
314.30	BGHL	80	330.1	PJAZ	301
314.30(C)	ZMWQ	497	330.2	PJAZ	301
314.40(A)	BGUZ	80	330.30(A)	DWMU	122
314.40(A)	DWTT	122	330.30(A)	ZODZ	498
314.40(A)	QCIT	326	330.30(D)(2)	PJOX	301
314.40(B)	QCIT	326	330.40	PJOX	301
314.40(C)	BGUZ	80	330.108	PJOX	301
314.40(D)	KDER	224	Article 332 - Mineral-Insulated, Metal-Sheathed Cable: Type MI		
314.41	QCIT	326	332.1	PPKV	306
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320.2	AWSX	73	334.15(B)	DYBY	125
320.30	DWMU	122	334.15(B)	DYIX	125
320.30	ZODZ	498	334.15(B)	DYWV	126
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322.30	RJBT	369	334.15(C)	FKAV	151
322.30	RJPR	370	334.30	DWMU	122
322.40	GQRS	176	334.30	ZODZ	498
322.40	RJBT	369	334.30(C)	RTRT	375
322.40	RJPR	370	334.30(C)	WJQR	436
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342.2	DYBY	125	Article 353 - High Density Polyethylene Conduit: Type HDPE Conduit		
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501.35(A)	CYWT	102	501.120(B)	NMTR	266
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501.35(B)	CYWT	102	501.120(B)(1)	WSQX	441
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501.135(B)(1)(1)	KGFR	229	502.10(B)(1)(2)	DYIX	125
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551.80(B)	FJMX	151	553.7(B)	DWTT	122
551.80(B)	QQRK	358	553.7(B)	DXAS	124
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552.10(B)(2)	ZMHX	492	553.7(B)	QPMU	351
552.10(E)(2)	FHXT	215	Article 555 - Marinas and Boatyards		
552.10(G)	IFDQ	189	555.3	DIYA	109
552.10(G)	IFDR	189	555.3	DKUY	110
552.20(B)	QPPY	352	555.3	KCXS	223
552.41(C)	DKUY	110	555.3	KCYC	223
552.41(C)	KCXS	223	555.3	KDAX	224
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552.43(A)	ELBZ	132	555.9	ZMWQ	497
552.43(B)	ELBZ	132	555.13(A)(2)	PDYQ	297
552.43(B)	QCRV	329	555.13(A)(2)	QPMU	351
552.44(A)	QCRV	329	555.13(B)(4)(5)(B)	QPYV	355
552.44(A)	ZJCZ	487	555.13(B)(5)	DWTT	122
552.44(C)(1)	AXUT	74	555.13(B)(5)	DYIX	125
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552.45(A)	QEUY	332	555.13(B)(5)	DYWV	126
552.45(A)	QPPY	352	555.13(B)(5)	DZKT	126
552.45(C)	QEUY	332	555.13(B)(5)	DZLR	127
552.45(C)	QPPY	352	555.13(B)(5)	DZYR	127
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552.46(B)(1)	ZDII	479	555.17(A)	WJAZ	435
552.48(B)	DYBY	125	555.17(A)	WJQR	436
552.48(B)	DYIX	125	555.19(A)(1)	AALZ	50
552.48(B)	DYWV	126	555.19(A)(1)	CYIV	98
552.48(C)	QCMZ	328	555.19(A)(1)	QPYV	355
552.48(E) Exc. No. 1	RTRT	375	555.19(A)(2)	QCRV	329
552.48(E) Exc. No. 1	WJQR	436	555.19(A)(3)	QEUY	332
552.48(E) Exc. No. 1	WMUZ	438	555.19(A)(3)	QPYV	355
552.48(H)	DWMU	122	555.19(A)(4)	QLGD	345
552.48(K)	QCIT	326	555.19(A)(4)	QLHN	345
552.48(N)	QAAV	318	555.19(A)(4)	QLIW	345
552.52(A)	WJQR	436	555.19(A)(4)	QLKH	346
552.52(B)	IEZR	183	555.19(A)(4)	RTRT	375
552.52(B)	IFAM	185	555.19(B)(1)	DKUY	110
552.52(B)	WIAX	432	555.19(B)(1)	KCXS	223
552.52(B)	WMUZ	438	555.23	PDYQ	297
552.53	RTRT	375	555.23	QPMU	351
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590.4(C)	WIAX 432	600.24(A)	UYMR 414
590.4(C)	ZJCZ 487	600.30	UZBL 415
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605.4	QAXE	320	610.32	WIAX	432
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610.13(C)	ZIPF	486	620.21	DYBY	125
610.13(C)	ZJCZ	487	620.21	DYIX	125
610.13(C)	ZKKA	489	620.21	DYWV	126
610.13(C)	ZMHX	492	620.21	DZYR	127
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610.14(A)	ZKST	490	620.21	PJAZ	301
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620.21(A)(2)(A)	DXHR	124	620.81	AWEZ	72
620.21(A)(2)(A)	DXOQ	124	620.81	PJAZ	301
620.21(A)(2)(A)	DXUZ	125	620.81	PPKV	306
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620.21(B)(3)	FQPB	157	626.22(D)	WGEU	429
620.21(B)(3)	ZJCZ	487	626.22(D)	WHXS	431
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620.21(C)(1)	DXHR	124	626.22(D)	WIOV	434
620.21(C)(1)	DXUZ	125	626.22(D)	WJAZ	435
620.21(C)(1)	ZGUW	486	626.22(D)	WJQR	436
620.21(C)(2)	QPTZ	355	626.23(B)	QCRV	329
620.21(C)(2)	ZGUW	486	626.24(A)	ZJCZ	487
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620.24(C)	RTRT	375	626.24(B)	QLIW	345
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620.34	DWMU	122	626.24(B)	RTRT	375
620.35	ZOYX	499	626.24(C)	DIVQ	107
620.36	QAYK	320	626.24(C)	DIYV	110
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620.53	WIAX	432	626.25(B)(1)	ZMHX	492
620.53	WJAZ	435	626.25(B)(2)	ZJCZ	487
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626.25(B)(4)(B)	QLKH	346	640.21(A)	ZJCZ	487
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626.25(B)(5)	QLHN	345	640.21(B)	QAYK	320
626.25(B)(5)	QLIW	345	640.21(C)	DUZX	119
626.25(B)(5)	QLKH	346	640.21(C)	PWIP	317
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626.27	QIGU	339	640.21(E)	ZJCZ	487
626.27	QIIO	341	640.23(B)	DXOQ	124
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626.31(C)	QLGD	345	640.41	QLGD	345
626.31(C)	QLHN	345	640.41	QLHN	345
626.31(C)	QLIW	345	640.41	QLIW	345
626.31(C)	QLKH	346	640.41	QLKH	346
626.31(C)	RTRT	375	640.41	RTRT	375
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626.32(B)	ZJCZ	487	640.42(A)	ZJCZ	487
626.32(C)	AXUT	74	640.42(B)	DUZX	119
626.32(C)	ELBZ	132	640.42(B)	ELBZ	132
626.32(C)	QLGD	345	640.42(B)	PWIP	317
626.32(C)	QLHN	345	640.42(B)	QAYK	320
626.32(C)	QLIW	345	640.42(B)	ZJCZ	487
626.32(C)	QLKH	346	640.42(C)	DUZX	119
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630.1	ZGPU	486	640.42(C)	ZJCZ	487
630.13	DIVQ	107	640.42(E)	ELBZ	132
630.13	WIAX	432	640.42(E)	ZJCZ	487
630.13	WJQR	436	640.43	QCRV	329
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640.1	ZCBY	478	645.3(F)	WYKM	447
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640.7(C)	RTRT	375	645.3(F)	WYXR	450
640.9(C)	AZJX	75	645.4(1)	NISD	258
640.9(C)	AZSQ	76	645.4(2)	ACVS	62
640.9(C)	AZUJ	76	645.4(2)	EMME	137
640.9(C)	UUMW	395	645.4(2)	LZFE	246
640.9(C)	ZCBY	478	645.4(3)	NWGQ	277
640.10(A)	KCXS	223	645.4(3)	NWIN	279
640.10(B)	AZJX	75	645.4(3)	QQGQ	356
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645.5(C)	EMRB	138	660.5	WGEU	429
645.5(E)(2)	AWEZ	72	660.5	WHXS	431
645.5(E)(2)	BGUZ	80	660.5	WIAX	432
645.5(E)(2)	DXHR	124	660.5	WJAZ	435
645.5(E)(2)	DXOQ	124	660.5	WJQR	436
645.5(E)(2)	DXUZ	125	660.7	ZMVV	495
645.5(E)(2)	DYBY	125	660.10	NYQD	281
645.5(E)(2)	DYIX	125	660.35	NYQD	281
645.5(E)(2)	DYWV	126	660.37	NYQD	281
645.5(E)(2)	DZLR	127	660.48	RTRT	375
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645.5(E)(2)	PJAZ	301	665.12	WGEU	429
645.5(E)(2)	PPKV	306	665.12	WHXS	431
645.5(E)(2)	QCIT	326	665.12	WIAX	432
645.5(E)(2)	QCMZ	328	665.12	WJAZ	435
645.5(E)(2)	RJBT	369	665.12	WJQR	436
645.5(E)(2)	RJTX	370	665.21	NITW	259
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645.5(E)(2)	ZOYX	499	Article 668 - Electrolytic Cells		
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645.5(E)(6)	EMRB	138	669.3	QQIJ	357
645.5(E)(6)(B)	DUZX	119	669.9	DIVQ	107
645.5(E)(6)(B)	DVCS	121	669.9	JDDZ	211
645.5(E)(6)(B)	HNHT	177	669.9	JDRX	214
645.5(E)(6)(B)	HNIR	178	669.9	JEFV	214
645.5(E)(6)(B)	NYTT	282	Article 670 - Industrial Machinery		
645.5(E)(6)(B)	QAYK	320	670.2	GPNY	173
645.5(E)(6)(B)	QPOR	351	670.2	NITW	259
645.5(E)(6)(B)	QPTZ	355	670.2	TETZ	396
645.10	NISD	258	670.2	TWKH	402
645.11	YEDU	472	670.2	TWPV	402
645.15	NWGQ	277	670.2	TWRF	402
645.17	NWGQ	277	670.2	TWSP	402
645.17	QPQY	353	670.2	TWTZ	403
Article 647 - Sensitive Electronic Equipment			670.2	TWWT	403
647.4(A)	DIVQ	107	670.3	NITW	259
647.4(A)	DKUY	110	670.4(A)	PVVA	314
647.4(A)	QEUY	332	670.4(C)	DIVQ	107
647.4(A)	WIAX	432	670.4(C)	JDDZ	211
647.7(A)(1)	KCXS	223	670.4(C)	JDRX	214
647.7(B)	RTRT	375	670.5	NITW	259
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650.1	AZSQ	76	675.4(B)	OFFY	284
650.1	PWHZ	316	675.4(B)	OFJZ	284
650.3(A)	AZJX	75	675.4(B)	ZMHX	492
650.3(A)	ZCBY	478	675.4(C)	DWMU	122
650.6	ZKST	490	675.4(D)	OFJZ	284
650.6	ZLGR	491	675.4(D)	QCRV	329
650.6(D)	OANZ	282	675.6	NITW	259
650.7	ZODZ	498	675.8(A)	NITW	259
Article 660 - X-Ray Equipment			675.8(A)	NKCR	263
660.1	NYQD	281	675.8(A)	NKJH	264
660.4(B)	RTRT	375	675.8(A)		

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675.8(A)	NLRV	265	680.23(B)(2)(b)	WCRY	425
675.8(A)	NMFT	265	680.23(C)	WBBDT	423
675.8(A)EXC.	DIVQ	107	680.23(D)	WBBDT	423
675.8(B)	DIVQ	107	680.23(E)	WBBDT	423
675.8(B)	WHXS	431	680.23(F)	DXOQ	124
675.8(B)	WIAX	432	680.23(F)	DYBY	125
675.8(B)	WJAZ	435	680.23(F)	DYIX	125
675.8(C)	DIVQ	107	680.23(F)	DYWV	126
675.8(C)	WHXS	431	680.23(F)	DZLR	127
675.8(C)	WIAX	432	680.23(F)	DZYR	127
675.8(C)	WJAZ	435	680.23(F)	FJMX	151
675.11	NMTR	266	680.23(F)	FKHU	152
675.11(A)	NMTR	266	680.23(F)	PJAZ	301
675.11(B)	NMTR	266	680.23(F)(1)	AWEZ	72
675.11(C)	NMTR	266	680.23(F)(1)	DZKT	126
675.11(D)	NMTR	266	680.24(A)	DZKT	126
675.17	AXGV	73	680.24(A)	WCEZ	425
675.17	AXUT	74	680.24(A)(1)	WCEZ	425
675.17	QLGD	345	680.24(B)	WDGV	427
675.17	QLHN	345	680.24(B)(1)	WDGV	427
675.17	QLIW	345	680.25(A)(1)	DYBY	125
675.17	QLKH	346	680.25(A)(1)	DYIX	125
675.17	RTDV	374	680.25(A)(1)	DYJC	126
675.17	RTRT	375	680.25(A)(1)	DYWV	126
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680.5	KCXS	223	680.25(A)(1)(2)	DZYR	127
680.9	WBRR	424	680.25(A)(1)(3)	DZKT	126
680.21(A)	DZLR	127	680.25(A)(1)(4)	FJMX	151
680.21(A)(1)	DYBY	125	680.25(A)(1)(5)	FKHU	152
680.21(A)(1)	DYIX	125	680.25(A)EXC.	DXUZ	125
680.21(A)(1)	DYWV	126	680.26(B)	DYBY	125
680.21(A)(1)	DZKT	126	680.26(B)	DYIX	125
680.21(A)(1)	DZYR	127	680.26(B)	DYWV	126
680.21(A)(1)	PJAZ	301	680.26(B)	KDER	224
680.21(A)(3)	DWTT	122	680.26(B)(2)(B)(3)	ZMVV	495
680.21(A)(3)	DXAS	124	680.26(B)(4)EXC.	WBBDT	423
680.21(A)(3)	DXHR	124	680.26(B)(6)	WCSX	426
680.21(A)(3)	DXOQ	124	680.26(B)(6)	WDDJ	426
680.21(A)(3)	AXUT	74	680.26(B)(6)(A)	WCSX	426
680.21(A)(5)	ELBZ	132	680.26(B)(6)(B)	WBRR	424
680.21(A)(5)	ZJCZ	487	680.26(C)	KDER	224
680.21(B)	WCSX	426	680.26(C)	WDUT	427
680.21(C)	DKUY	110	680.26(E)	WBRR	424
680.21(C)	KCXS	223	680.27(A)(1)	UEAY	406
680.22(A)(4)	DKUY	110	680.27(A)(2)	DXOQ	124
680.22(A)(4)	KCXS	223	680.27(A)(2)	DYBY	125
680.22(B)(2)(2)	GPRT	174	680.27(A)(2)	DYIX	125
680.22(B)(4)	DKUY	110	680.27(A)(2)	DYWV	126
680.22(B)(4)	KCXS	223	680.27(A)(2)	DZKT	126
680.23	WBBDT	423	680.27(A)(2)	DZLR	127
680.23(A)(2)	WDGV	427	680.27(A)(2)	DZYR	127
680.23(A)(3)	KCXS	223	680.27(A)(2)	WBBDT	423
680.23(A)(8)	DKUY	110	680.27(A)(2)	WCEZ	425
680.23(A)(8)	KCXS	223	680.27(A)(2)	WCRY	425
680.23(A)(8)	WBBDT	423	680.27(A)(3)	WBBDT	423
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680.23(A)(8)	WDGV	427	680.27(B)(2)	DKUY	110

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680.31	WCSX	426	680.62(E)	DKUY	110
680.32	DKUY	110	680.62(E)	KCXS	223
680.32	KCXS	223	680.70	NCHX	256
680.33	WBDT	423	680.71	DKUY	110
680.40	WBYQ	424	680.71	KCXS	223
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680.42(A)	WCZW	426	682.13	DWTT	122
680.42(A)(1)	DXOQ	124	682.13	DXHR	124
680.42(A)(2)	AXUT	74	682.13	DXOQ	124
680.42(A)(2)	DKUY	110	682.13	QPMU	351
680.42(A)(2)	ELBZ	132	682.14	AXUT	74
680.42(A)(2)	KCXS	223	682.14	ZJCZ	487
680.42(A)(2)	ZJCZ	487	682.14(A)	DIVQ	107
680.43 EXC.	WBYQ	424	682.14(A)	WGEU	429
680.43 EXC.	WCZW	426	682.14(A)	WHXS	431
680.43(A)	RTRT	375	682.14(A)	WIAX	432
680.43(A)(2)	DKUY	110	682.14(A)	WJAZ	435
680.43(A)(2)	KCXS	223	682.15	DKUY	110
680.43(A)(3)	DKUY	110	682.15	KCXS	223
680.43(A)(3)	KCXS	223	682.23(C)	KDER	224
680.43(B)(2)	WBDT	423	Article 690 - Solar Photovoltaic Systems		
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680.43(D)(2)	WCZW	426	690.2	QHYZ	338
680.44	DKUY	110	690.2	QIBP	338
680.44	KCXS	223	690.2	QICP	338
680.44(A)	WCZW	426	690.2	QIGU	339
680.44(B)	WBYQ	424	690.2	QIGZ	340
680.50	AWEG	72	690.2	QIIA	340
680.51(A)	KCXS	223	690.2	QIIO	341
680.51(A)	WBDT	423	690.2	QIJL	341
680.51(A)	WDGV	427	690.2	QIKA	341
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680.52(A)	WCEZ	425	690.4(C)	QIGU	339
680.52(A)	WDGV	427	690.4(C)	QIGZ	340
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680.52(B)(2)	WCRY	425	690.4(D)	QHZK	336
680.56(A)	DKUY	110	690.4(D)	QHZQ	337
680.56(A)	KCXS	223	690.4(D)	QHZU	338
680.56(B)	ZJCZ	487	690.4(D)	QIBP	338
680.56(C)	WCRY	425	690.4(D)	QICP	338
680.56(D)	AXUT	74	690.4(D)	QIGU	339
680.56(D)	ELBZ	132	690.4(D)	QIGZ	340
680.56(D)	RTRT	375	690.4(D)	QIIA	340
680.56(D)	ZJCZ	487	690.4(D)	QIIO	341
680.57(A)	UXYT	413	690.4(D)	QIJL	341
680.57(B)	DKUY	110	690.4(D)	QIKH	342
680.57(B)	KCXS	223	690.4(G)EXC.	DIUR	107
680.57(C)(1)	UXYT	413	690.4(G)EXC.	WEVZ	428
680.57(C)(2)	UXYT	413	690.4(G)EXC.	WFJX	429
680.58	DKUY	110	690.4(G)EXC.	WHXX	432
680.58	KCXS	223	690.4(G)EXC.	WIBC	433
680.60	PIDF	299	690.4(G)EXC.	WJBE	435
680.61	PIDF	299	690.5	QIIO	341
680.62	PIDF	299	690.5(A)	QIBP	338
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690.6(B)	QHYZ	336	690.16(B)	JFGA	215
690.6(C)	DIVQ	107	690.16(B)	WHXX	432
690.6(C)	QIIO	341	690.16(B)	WIBC	433
690.6(C)	WGEU	429	690.16(B)	WJBE	435
690.6(C)	WHXS	431	690.17	DIUR	107
690.6(C)	WIAX	432	690.17	DIVQ	107
690.6(C)	WJQR	436	690.17	QIIO	341
690.6(D)	QIIO	341	690.17	WGEU	429
690.8(B)(1)	DIUR	107	690.17	WHXS	431
690.8(B)(1)	JFGA	215	690.17	WHXX	432
690.8(B)(1)	WHXX	432	690.17	WIAX	432
690.8(B)(1)	WIBC	433	690.17	WIBC	433
690.8(B)(1)	WJBE	435	690.17	WJAZ	435
690.9(C)	DIUR	107	690.17	WJBE	435
690.9(C)	JDDZ	211	690.17	WJQR	436
690.9(C)	JDRX	214	690.31(A)	ZKLA	489
690.9(C)	JFGA	215	690.31(B)	TYLZ	404
690.9(D)	DIUR	107	690.31(B)	ZGZN	485
690.9(D)	DIVQ	107	690.31(B)	ZKLA	489
690.9(D)	JDDZ	211	690.31(C)	QPMU	351
690.9(D)	JFGA	215	690.31(C)	ZJCZ	487
690.9(D)	WHXX	432	690.31(C)	ZKLA	489
690.9(D)	WIBC	433	690.31(E)	PJAZ	301
690.9(D)	WJBE	435	690.31(F)	ZMVV	495
690.10(A)	QIKH	342	690.35(A)	DIUR	107
690.10(C)	QIKH	342	690.35(A)	WHXX	432
690.10(E)	DIVQ	107	690.35(A)	WIBC	433
690.11	QIDC	339	690.35(A)	WJBE	435
690.11	QIKH	342	690.35(B)	DIUR	107
690.13	DIUR	107	690.35(B)	JFGA	215
690.13	JFGA	215	690.35(B)	WHXX	432
690.13	WHXX	432	690.35(B)	WIBC	433
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690.13	WJBE	435	690.35(C)	QIKH	342
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690.14	WHXX	432	690.35(G)	QIKH	342
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690.14	WJBE	435	690.43(C)	QIMS	343
690.14(C)(3)	DIUR	107	690.43(D)	QIMS	343
690.14(C)(3)	WHXX	432	690.43(E)	QIMS	343
690.14(C)(3)	WIBC	433	690.47(A)	KDER	224
690.14(C)(3)	WJBE	435	690.47(B)	KDER	224
690.14(D)	QIKH	342	690.51	QHZU	338
690.15	DIVQ	107	690.51	QIGU	339
690.15	QIIO	341	690.51	QIGZ	340
690.15	WGEU	429	690.51	QIIA	340
690.15	WHXS	431	690.52	QHYZ	336
690.15	WHXX	432	690.52	QIGU	339
690.15	WIAX	432	690.52	QIGZ	340
690.15	WIBC	433	690.53	DIUR	107
690.15	WJAZ	435	690.53	JFGA	215
690.15	WJBE	435	690.53	QICP	338
690.15	WJQR	436	690.53	QIJL	341
690.16(A)	JFGA	215	690.53	WHXX	432
690.16(A)	QIIO	341	690.53	WIBC	433
690.16(A)	WHXX	432	690.53	WJBE	435
690.16(A)	WIBC	433	690.60	QHYZ	336

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690.71(A)	BBFX	78	694.22(A)	WJAZ	435
690.71(E)	DIUR	107	694.26	WGUEU	429
690.71(E)	WHXX	432	694.26	WGUEU	429
690.71(E)	WIBC	433	694.26	WHTY	430
690.71(E)	WJBE	435	694.26	WHTY	430
690.72(A)	QIBP	338	694.26	WHXS	431
690.72(B)(1)	QIBP	338	694.26	WHXS	431
690.72(B)(2)	QIBP	338	694.26	WIAX	432
690.72(B)(3)	QIKH	342	694.26	WIAX	432
690.72(C)	QIBP	338	694.26	WJAZ	435
690.74(A)	ZMVV	495	694.26	WJAZ	435
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692.1	IRGZ	205	694.30(B)	ZJGZ	487
692.1	IUXX	205	694.40(C)(1)	KDER	224
692.1	QIKH	342	694.40(C)(3)	KDER	224
692.6	IRGN	203	694.40(C)(3)	OVTZ	291
692.6	IRGZ	205	694.40(C)(3)	OWAY	291
692.10(A)	IRGZ	205	694.40(C)(3)	ZMVV	495
692.17	DIVQ	107	694.60	QIKH	342
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692.17	WHXS	431	694.70	BBFX	78
692.17	WIAX	432	694.70(A)	BBFX	78
692.17	WIOV	434	694.70(C)	DIVQ	107
692.17	WJAZ	435	694.70(C)	JDDZ	211
692.59	WPTZ	438	694.70(C)	JDRX	214
692.59	WPWR	439	694.70(C)	JEFV	214
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694.2	QIKH	342	695.4(A)	QZKE	365
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694.2	ZGEN	482	695.4(B)	QZGR	365
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694.7(E)	RTRT	375	695.5	XQNX	467
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694.15(C)	JCSA	211	695.6(A)(2)(D)(3)	FHIT	150
694.15(C)	JDDZ	211	695.6(A)(2)(D)(3)	FHIY	150
694.22(A)	DIVQ	107	695.6(A)(2)(D)(3)	FHJR	151
694.22(A)	DIVQ	107	695.6(B)(1)	QXZF	364
694.22(A)	WGUEU	429	695.6(B)(2)	QXZF	364
694.22(A)	WGUEU	429	695.6(D)	DXAS	124
694.22(A)	WHTY	430	695.6(D)	DXHR	124
694.22(A)	WHTY	430	695.6(D)	DXOQ	124
694.22(A)	WHXS	431	695.6(D)	DYBY	125
694.22(A)	WHXS	431	695.6(D)	DYIX	125
694.22(A)	WIAX	432	695.6(D)	DYVV	126

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695.6(H)	FHIT	150	701.12(A)	BBHH	78
695.6(I)	BGUZ	80	701.12(B)(1)	FTSR	167
695.6(I)(4)	BGUZ	80	701.12(B)(2)	FTSR	167
695.6(I)(5)	ZMVV	495	701.12(B)(4)	BBHH	78
695.6(J)(1)	DWTT	122	701.12(B)(5)	FTSR	167
695.10	QXZF	364	701.12(C)	YEDU	472
695.10	QYZS	365	701.12(C)	YEET	473
695.10	QZGR	365	701.12(E)	IRGZ	205
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695.14(E)	BXUV	84	702.5	WIAX	432
695.14(E)	DXAS	124	702.5	WPTZ	438
695.14(E)	DXHR	124	702.5	WPWR	439
695.14(E)	DXOQ	124	702.5	WPXT	439
695.14(E)	DYBY	125	702.5	WPXW	440
695.14(E)	DYIX	125	702.5	WPYV	440
695.14(E)	DYWV	126	702.11(A)	FTCN	164
695.14(E)	FHIT	150	702.11(A)	KDER	224
695.14(E)	FHIY	150	702.11(B)	FTCN	164
695.14(E)	FHJR	151	702.11(B)	KDER	224
695.14(E)	PPKV	306	702.12	FTSR	167
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695.14(F)(3)	FHIT	150	705.4	FTSR	167
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700.5(A)	WPTZ	438	705.4	QIJL	341
700.5(A)	WPWR	439	705.4	QIKH	342
700.5(B)	WPVQ	439	705.4	ZGFA	483
700.5(C)	WPTZ	438	705.12	QIJL	341
700.5(C)	WPWR	439	705.12(D)	QIKH	342
700.6(D)	KDAX	224	705.12(D)	ZGFA	483
700.10(B)(3)	FTBR	163	705.12(D)(2)EXC.	QIKH	342
700.10(D)(1)(2)	FHIT	150	705.12(D)(2)EXC.	ZGFA	483
700.10(D)(1)(3)	XCLF	456	705.12(D)(3)EXC.	QIIO	341
700.10(D)(1)(4)	BXUV	84	705.12(D)(5)	DIVQ	107
700.10(D)(2)	BXUV	84	705.12(D)(6)	DIVQ	107
700.12(A)	BBHH	78	705.21	QIIO	341
700.12(A)	FTBR	163	705.21	QIKH	342
700.12(B)(1)	FTSR	167	705.22	DIVQ	107
700.12(B)(2)	FTSR	167	705.22	QIIO	341
700.12(B)(4)	BBHH	78	705.22	WHXS	431
700.12(B)(6)	FTSR	167	705.22	WIAX	432
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830.113(E)	XHEZ	458	840.101(A)	KDSH	225
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Index of UL Product Categories Correlated to the 2008 NEC®

The Index of UL Product Categories Correlated to the 2008 NEC is intended to act merely as a tool for the User to identify potential UL Product Category Codes and their location in this publication. Locating the Product Category Code on the pages indicated will provide the User with the UL Guide Information for the applicable Category Code. This Correlation Index may not be a comprehensive list. There may be other UL Product Categories for which Listed products are covered that may be applicable to the Code Section. The User should independently confirm the applicability of the Product Category to the Code Section and verify that no other UL Product Categories apply to the installation. The installation of products for the Categories identified in this index are subject to the approval by the Authority Having Jurisdiction (AHJ).

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300.22(C)(1)	DYBY	125	310.13	TYLZ	404
300.22(C)(1)	DYIX	125	310.13	YDUX	472
300.22(C)(1)	DYWV	126	310.13	ZKHZ	489
300.22(C)(1)	FJMX	151	310.13	ZKST	490
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300.22(C)(1)	ILJW	201	310.14	TYLZ	404
300.22(C)(1)	PJAZ	301	310.14	ZKST	490
300.22(C)(1)	PPKV	306	310.14	ZLGR	491
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300.22(C)(1)	RJBT	369	310.15(B)	ZLGR	491
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300.22(C)(2)	XHLY	460	Article 312 - Cabinets, Cutout Boxes and Meter Socket Enclosures		
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300.37	CYNW	101	312.1	PJSR	303
300.37	CYOV	101	312.1	PJVV	303
300.37	DYBY	125	312.1	PJVT	303
300.37	DYIX	125	312.1	PJXS	304
300.37	DYWV	126	312.1		

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312.2(A)	FKAV	151	314.23(G)	QCMZ	328
312.5	CYIV	98	314.23(H)(1)	QCRV	329
312.5	PJSR	303	314.23(H)(1)	ZJCZ	487
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312.5	PJWT	303	314.25(A)	QCMZ	328
312.5	PJXS	304	314.25(C)	QCRV	329
312.5	PJYZ	304	314.27(A)	QBWY	326
312.5(A)	QCRV	329	314.27(A)	QCIT	326
312.5(B)	DWTT	122	314.27(A)	QCMZ	328
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312.5(C)	QCRV	329	314.27(B)	QCIT	326
312.8	DIVQ	107	314.27(B)	QCMZ	328
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312.8	WGEU	429	314.27(C)	QCIT	326
312.8	WIAX	432	314.27(C)	QCMZ	328
312.8	WJAZ	435	314.27(D)	QBWY	326
312.10	CYIV	98	314.27(D)	QCIT	326
312.10	PJYZ	304	314.27(D)	QCMZ	328
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314.1	DWTT	122	314.28	QCIT	326
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314.1	QCIT	326	314.28(C)	BGUZ	80
314.1	QCKW	328	314.28(C)	DWTT	122
314.1	QCMZ	328	314.28(C)	QBWY	326
314.1	WCEZ	425	314.28(C)	QCIT	326
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314.5	QCIT	326	314.29	BGUZ	80
314.5	QCKW	328	314.29	QCIT	326
314.5	QCMZ	328	314.30	QCMZ	328
314.15	BGHL	80	314.30	BGHL	80
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314.15	QCKW	328	314.40(A)	QCIT	326
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314.15	WCEZ	425	314.40(C)	BGUZ	80
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322.30	RJPR	370	334.15(C)	FKAV	151
322.40	GQRS	176	334.30	DWMU	122
322.40	RJBT	369	334.30	ZODZ	498
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455.8(B)	WIAX	432	490.47	DLAH	111
455.8(B)	WJAZ	435	490.47	DLBC	113
455.22	NLDX	265	490.47	DLBK	113
455.22	NLRV	265	490.47	WVEK	443
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460.8(B)	WHXS	431	500.1	AANZ	53
460.8(B)	WIAX	432	500.2	JTPX	222
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460.8(C)	WHXS	431	500.8	AAIZ	47
460.8(C)	WIAX	432	500.8(A)	AAIZ	47
460.8(C)	WJAZ	435	500.8(C)(3) Exc	IFUX	195
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460.9	NLDX	265	500.8(C)(3) Exc	IGMX	197
460.9	NLRV	265	500.8(E)(1)	CYMX	101
460.9	NMFT	265	500.8(E)(1)	DYBY	125
460.9	NMMS	266	500.8(E)(1)	DYIX	125
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500.8(E)(2)	DYBY	125	501.15(B)(1)	RFPW	366
500.8(E)(2)	DYIX	125	501.15(B)(2)	DYBY	125
500.8(E)(2)	DYWV	126	501.15(B)(2)	DYIX	125
500.8(E)(2)	EBNV	129	501.15(B)(2)	DYWV	126
500.8(F)	QAYK	320	501.15(B)(2)	EBNV	129
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500.8(F)	QBFA	325	501.15(B)(2) Exc 2	CYNW	101
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501.10(A)(1)(a)	DYWV	126	501.15(B)(2) Exc 4(4)	DYBY	125
501.10(A)(1)(a) Exc	DZKT	126	501.15(B)(2) Exc 4(4)	DYIX	125
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501.10(A)(1)(b)	POWD	306	501.15(C)(5)	EBNV	129
501.10(A)(1)(b)	POWX	306	501.15(C)(5)	FTRV	166
501.10(A)(1)(b)	PPKV	306	501.15(D)	CYMX	101
501.10(A)(1)(c)	CYMX	101	501.15(D)(1)	CYMX	101
501.10(A)(1)(c)	PJPP	302	501.15(D)(1)	PJPP	302
501.10(A)(1)(d)	PJPP	302	501.15(E)(1)	CYMX	101
501.10(A)(2)	EBNV	129	501.15(F)(2)	PSPT	311
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501.10(A)(3)	EBNV	129	501.15(F)(2)	PTHE	311
501.10(A)(3)	QBCR	324	501.15(F)(2)	PTKQ	312
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501.10(B)(1)(7)	DZYZ	127	501.35(B)	VZQK	419
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501.10(B)(2)	DXUZ	125	501.105(A)	FTRV	166
501.10(B)(2)	EBNV	129	501.105(A)	RFPW	366
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501.15(A)(2)	EBNV	129	501.105(B)(1)	WSQX	441
501.15(A)(2)	RFPW	366	501.105(B)(1)	WTEV	441
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502.10(A)(1)(2)	POWX	306	502.130(A)(3)	DYBY	125
502.10(A)(1)(2)	PPKV	306	502.130(A)(3)	DYIX	125
502.10(A)(1)(3)	PJPP	302	502.130(A)(3)	DYWV	126
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502.10(A)(2)(3)	DXOQ	124	502.130(B)(2)	FTRV	166
502.10(A)(2)(3)	EBNV	129	502.130(B)(2)	IFUX	195
502.10(A)(2)(4)	CYMX	101	502.130(B)(2)	IGIV	197
502.10(A)(2)(4)	PJPP	302	502.130(B)(4)	DYBY	125
502.10(A)(2)(5)	ZJCZ	487	502.130(B)(4)	DYIX	125
502.10(B)(1)(2)	DYBY	125	502.130(B)(4)	DYWV	126
502.10(B)(1)(2)	DYIX	125	502.130(B)(4)	IFUX	195
502.10(B)(1)(2)	DYWV	126	502.130(B)(4)	IGIV	197
502.10(B)(1)(2)	FJMX	151	502.130(B)(4)	ZJCZ	487
502.10(B)(1)(2)	ZOYX	499	502.135(B)(1)	KFVR	229
502.10(B)(1)(3)	PJAZ	301	502.135(B)(1)	KGFR	229
502.10(B)(1)(3)	PJOX	301	502.135(B)(1)	KGIZ	229
502.10(B)(1)(3)	PPKV	306	502.135(B)(1)	KGWX	229
502.10(B)(1)(3)	PPYT	306	502.135(B)(1)	KHCM	230
502.10(B)(1)(4)	QPTZ	355	502.135(B)(2)	PTDR	311
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502.30(B)	DXHR	124	502.150(A)(3)	PTDR	311
502.30(B)	DXUZ	125	502.150(B)(1)	FTRV	166
502.35	FTRV	166	502.150(B)(3)	FTRV	166
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502.35	VZQK	419	502.150(B)(4)	PTDR	311
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502.100(A)	XOYT	465	503.10(A)	DYWV	126
502.100(A)	XPTQ	466	503.10(A)	FJMX	151
502.100(A)	XQNX	467	503.10(A)	PJAZ	301
502.100(B)	CYWT	102	503.10(A)	PJOX	301
502.100(B)	XOKV	465	503.10(A)	PPKV	306
502.100(B)	XOYT	465	503.10(A)	PPYT	306
502.100(B)	XPTQ	466	503.10(A)	ZOYX	499
502.100(B)	XQNX	467	503.10(A)(2)	DWTT	122
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502.115(A)(1)	FTRV	166	503.10(A)(2)	ZJCZ	487
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503.130(C)	DYIX	125	505.15(C)(1)(g)	DZKT	126
503.130(C)	DYWV	126	505.15(C)(1)(g)	DZLR	127
503.130(C)	IFUX	195	505.15(C)(1)(g)	DZXR	127
503.130(C)	IGIV	197	505.15(C)(1)(g)	EAZX	128
503.130(C)	IGMX	197	505.15(C)(2)	DXHR	124
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503.135(A)	KHCM	230	505.16	EBNV	129
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504.4	OERX	283	505.16(B)(4)	EBMB	128
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504.30(A)(1) EXC 2	PPKV	306	505.16(B)(6)	CYMJ	100
504.30(A)(3) EXC	PJAZ	301	505.16(B)(7)	CYMJ	100
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505.15(B)(1)(c)	NYTT	282	505.16(C)(2)	FTRV	166
505.15(B)(1)(d)	POWD	306	505.16(D)	CYMJ	100
505.15(B)(1)(d)	POWX	306	505.16(D)	EBNV	129
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505.15(B)(1)(f)	DZLR	127	505.25	KDER	224
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505.15(C)(1)(b)	PJOX	301	506.9(E)(1)	CYMJ	100
505.15(C)(1)(b)	PPKV	306	506.9(E)(1)	EBMB	128
505.15(C)(1)(b)	PPYT	306	506.15(A)(1)	DYBY	125
505.15(C)(1)(c)	NYTT	282	506.15(A)(1)	DYIX	125
505.15(C)(1)(d)	QPTZ	355	506.15(A)(1)	DYWV	126
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506.15(A)(3)	CYMX	101	511.12	DKUY	110
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506.15(C)(2)	DYIX	125	513.9	EBNV	129
506.15(C)(2)	DYWV	126	513.10(B)	NMTR	266
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506.15(C)(2)	ZOYX	499	513.10(D)(2)	RRAT	372
506.15(C)(3)	CYMX	101	513.10(D)(2)	ZJCZ	487
506.15(C)(3)	PJPP	302	513.10(E)(1)	QPKX	351
506.15(C)(3)	POWD	306	513.10(E)(1)	ZJCZ	487
506.15(C)(3)	POWX	306	513.10(E)(2)	ZJCZ	487
506.15(C)(4)	QPTZ	355	513.16(B)(1)	RRAT	372
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547.5(B)	DWMU	122	550.15(E)	PWVX	317
547.5(C)(1)	AALZ	50	550.15(E)	TYLZ	404
547.5(C)(2)	AALZ	50	550.15(F)	DYBY	125
547.5(C)(3)	AALZ	50	550.15(F)	DYIX	125
547.5(D)	DWTT	122	550.15(F)	DYWV	126
547.5(D)	DXHR	124	550.15(F)	DZLR	127
547.5(D)	DXOQ	124	550.15(F)	DZYR	127
547.5(D)	QCRV	329	550.15(F)	FKHU	152
547.5(D)	ZJCZ	487	550.15(F)	RJBT	369
547.5(G)	DKUY	110	550.15(G)(2)	WJQR	436
547.5(G)	KCXS	223	550.15(H)	DYBY	125
547.7	PRGY	308	550.15(H)	DYIX	125
547.9(A)	WIAX	432	550.15(H)	DYWV	126
547.10(B)	KDER	224	550.15(H) Exc	DZLR	127
Article 550 - Mobile Homes, Manufactured Homes and Mobile Home Parks				550.15(H) Exc	DZYR	127
550.1	PDOV	297	550.15(H) Exc	FJMX	151
550.10(B)	ELBZ	132	550.15(H) EXC	PPKV	306
550.10(B)	ZJCZ	487	550.15(I) Exc.	RTRT	375
550.10(C)	ELBZ	132	550.15(I) Exc.	WJQR	436
550.10(C)	RTRT	375	550.15(I) Exc.	WMUZ	438
550.10(C)	ZJCZ	487	550.15(K)	QAAV	318
550.10(D)	ELBZ	132	550.16(A)(2)	AWEZ	72
550.10(D)	ZJCZ	487	550.16(A)(2)	AXUT	74
550.10(D)	ZJCZ	487	550.16(A)(2)	DXUZ	125
550.10(I)(2)	DYBY	125	550.16(A)(2)	ELBZ	132
550.10(I)(2)	DYIX	125	550.16(A)(2)	PJAZ	301

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550.16(C)(2)	KDER	224	551.47(E) Exc. No. 1	RTRT	375	
550.16(C)(3)	KDER	224	551.47(E) Exc. No. 1	WJQR	436	
550.20(A)	QCIT	326	551.47(E) Exc. No. 1	WMUZ	438	
550.20(A)	QCMZ	328	551.47(G)	AWEZ	72	
550.20(A)	RTRT	375	551.47(G)	DWMU	122	
550.20(B)	QCIT	326	551.47(G)	FKHU	152	
550.20(B)	QCMZ	328	551.47(G)	PJAZ	301	
550.20(B)	WIAX	432	551.47(G)	PWVX	317	
550.25(B)	AVYI	70	551.47(I)	DWMU	122	
550.25(B)	AWAH	70	551.47(L)	QCIT	326	
550.32(A)	QPYV	355	551.47(L)	QCMZ	328	
550.32(B)	QPYV	355	551.47(N)	DYBY	125	
550.32(C)	RTRT	375	551.47(N)	DYIX	125	
550.32(E)	DKUY	110	551.47(N)	DYWV	126	
550.32(E)	KCXS	223	551.47(N)	DZLR	127	
550.32(E)	RTRT	375	551.47(N)	DZYR	127	
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551.4(B) Inf. Note	ZKRU	490	551.47(O)	QAAV	318	
551.20(B)	QPPY	352	551.47(P)(1)	ELBZ	132	
551.20(F)	AXUT	74	551.47(P)(2)	QCRV	329	
551.20(F)	RTRT	375	551.47(P)(2)	ZJCZ	487	
551.30	FTSR	167	551.47(P)(2)(e)	DYBY	125	
551.30(B)	RTRT	375	551.47(P)(2)(e)	DYIX	125	
551.30(B)	WPYV	440	551.47(P)(2)(e)	DYWV	126	
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551.33	WPXT	439	551.53(B)	DKUY	110	
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551.40(C)	DKUY	110	551.53(B)	IEZX	183	
551.40(C)	KCXS	223	551.53(B)	IFAO	185	
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551.41(C)	KCXS	223	551.55(C)(1)	QEUY	332	
551.42(C)	PAZX	296	551.55(C)(1)	AWEZ	72	
551.42(C)	QEUY	332	551.55(C)(1)	PJAZ	301	
551.42(D)	QEUY	332	551.55(C)(2)	PPKV	306	
551.43(A)	QPPY	352	551.55(F)	KDER	224	
551.43(B)	QPPY	352	551.56(C)	SKKQ	383	
551.43(C)	QPPY	352	551.56(C)	KDER	224	
551.43(D)	QPPY	352	551.56(C)	RTRT	375	
551.45(A)	QEUY	332	551.71	ZMVV	495	
551.45(C)	QEUY	332	551.76(A)	QPYV	355	
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551.46(C)(3)	AXUT	74	551.80(A)	ZMVV	495	
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552.41(C)	DKUY	110	555.17(A)	WJAZ	435
552.41(C)	KCXS	223	555.17(A)	WJQR	436
552.41(D)	KQVU	240	555.19(A)(1)	AALZ	50
552.43(A)	ELBZ	132	555.19(A)(1)	CYIV	98
552.43(B)	ELBZ	132	555.19(A)(1)	QPYV	355
552.43(B)	QCRV	329	555.19(A)(2)	QCRV	329
552.44(A)	QCRV	329	555.19(A)(3)	QEUY	332
552.44(A)	ZJCZ	487	555.19(A)(3)	QPYV	355
552.44(C)(1)	AXUT	74	555.19(A)(4)	QLGD	345
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552.45(A)	QEUY	332	555.19(A)(4)	QLIW	345
552.45(A)	QPPY	352	555.19(A)(4)	QLKH	346
552.45(C)	QEUY	332	555.19(A)(4)	RTRT	375
552.45(C)	QPPY	352	555.19(B)(1)	DKUY	110
552.46(A)	PAZX	296	555.19(B)(1)	KCXS	223
552.46(B)(1)	ZDHR	478	555.23	PDYQ	297
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552.52(B)	IFAM	185	590.4(C)	QPYV	355
552.52(B)	WIAX	432	590.4(C)	ZJCZ	487
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552.54(B)	IFAM	185	590.4(J)	DWMU	122
552.54(B)	IFAO	185	590.4(J)	QCRV	329
552.54(B)	KCXS	223	590.4(J)	ZODZ	498
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552.59(A)	QCIT	326	590.6(A)	KCXS	223
552.59(A)	QCMZ	328	590.6(B)(1)	DKUY	110
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600.8(B)	UYAM	413	605.4(4)	AXUT	74
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600.8(D)	UYAM	413	605.5	QAWZ	319
600.10(B)	AXUT	74	605.5	QAXB	320
600.10(C)(1)	ELBZ	132	605.5	QAXE	320
600.10(C)(1)	ZJCZ	487	605.6	QAWZ	319
600.10(C)(2)	ELBZ	132	605.6	QAXE	320
600.10(C)(2)	KCXS	223	605.7	QAWZ	319
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600.32(K)	UYMR	414	610.12(B)	DYIX	125
600.41(B)	UYMR	414	610.12(B)	DYWV	126
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600.42(C)	UYMR	414	610.12(B)	QCRV	329
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600.42(F)	UYMR	414	610.13(C)	ZIPF	486
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610.31	WJAZ	435	620.21(A)(1)(c)	ZJCZ	487
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610.32	WJAZ	435	620.21(A)(1)(d)(4)	ZJCZ	487
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610.51(A)	NKCR	263	620.21(A)(2)(d)(4)	ZJCZ	487
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610.51(A)	NLDX	265	620.21(A)(3)(a)	DXHR	124
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610.51(A)	NMFT	265	620.21(A)(3)(a)	DXUZ	125
610.51(B)	NKCR	263	620.21(A)(3)(a)	FQPB	157
610.51(B)	NKJH	264	620.21(A)(3)(b)	ZOYX	499
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620.21	DYWV	126	620.35	ZOYX	499
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620.53	WJQR	436	626.25(B)(4)	ELBZ	132
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620.54	WIAX	432	626.25(B)(4)(b)	QLKH	346
620.54	WJAZ	435	626.25(B)(5)	AXUT	74
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626.22(D)	WGEU	429	626.32(C)	QLGD	345
626.22(D)	WHXS	431	626.32(C)	QLHN	345
626.22(D)	WIAX	432	626.32(C)	QLIW	345
626.22(D)	WIOV	434	626.32(C)	QLKH	346
626.22(D)	WJAZ	435	626.32(C)	ZJCZ	487
626.22(D)	WJQR	436	Article 630 - Electric Welders		
626.23(B)	QCRV	329	630.1	ZGLZ	485
626.24(A)	ZJCZ	487	630.1	ZGPU	486
626.24(B)	QLGD	345	630.13	DIVQ	107
626.24(B)	QLHN	345	630.13	WIAX	432
626.24(B)	QLIW	345	630.13	WJQR	436
626.24(B)	QLKH	346	630.41	ZMAY	492
626.24(B)	RTRT	375	Article 640 - Audio Signal Processing, Amplification and Reproduction Equipment		
626.24(C)	DIVQ	107	640.1	AZJX	75
626.24(C)	DIYV	110	640.1	AZSQ	76
626.24(C)	WGEU	429	640.1	NWGQ	277
626.24(C)	WHXS	431	640.1	PWHZ	316
626.24(C)	WIAX	432	640.1	ZCBY	478
626.24(C)	WJAZ	435	640.1	CWFT	97
626.24(C)	WJQR	436	640.6(A)(4)	ZOYX	499
626.24(D)	DKUY	110	640.7(A)	RTRT	375
626.24(D)	KCXS	223	640.7(C)	ZCBY	478
626.25	ELBZ	132	640.9	AZJX	75
626.25(A)(1)	ELBZ	132	640.9(C)	AZSQ	76
626.25(A)(2)	ELBZ	132	640.9(C)	AZUJ	76
626.25(B)(1)	ZJCZ	487	640.9(C)		

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640.10(B)	AZJX	75	645.5(D)(2)	DXOQ	124
640.10(B)	AZSQ	76	645.5(D)(2)	DXUZ	125
640.10(B)	EPBU	142	645.5(D)(2)	DYBY	125
640.10(B)	ZCBY	.....	478	645.5(D)(2)	DYIX	.....	125
640.21(A)	ELBZ	.....	132	645.5(D)(2)	DYWV	.....	126
640.21(A)	ZJCZ	.....	487	645.5(D)(2)	DZLR	.....	127
640.21(B)	DUZX	.....	119	645.5(D)(2)	DZYR	.....	127
640.21(B)	PWIP	.....	317	645.5(D)(2)	FJMX	.....	151
640.21(B)	QAYK	.....	320	645.5(D)(2)	FKHU	.....	152
640.21(C)	DUZX	.....	119	645.5(D)(2)	PJAZ	.....	301
640.21(C)	PWIP	.....	317	645.5(D)(2)	PPKV	.....	306
640.21(C)	QAYK	.....	320	645.5(D)(2)	RJBT	.....	369
640.21(E)	ELBZ	.....	132	645.5(D)(2)	RJTX	.....	370
640.21(E)	ZJCZ	.....	487	645.5(D)(2)	RKCZ	.....	370
640.23(B)	DXOQ	.....	124	645.5(D)(2)	ZOYX	.....	499
640.23(B)	DZLR	.....	127	645.5(D)(3)	NWGQ	.....	277
640.23(B)	DZYR	.....	127	645.5(D)(4)	UROX	.....	390
640.23(B)	QCRV	.....	329	645.5(D)(4)	URXG	.....	392
640.24	ZOYX	.....	499	645.5(D)(5)(c)	DUZX	.....	119
640.25	CHML	.....	96	645.5(D)(6)	EMRB	.....	138
640.41	AXGV	.....	73	645.5(D)(6)(c)	DVCS	.....	121
640.41	AXUT	.....	74	645.5(D)(6)(c)	HNHT	.....	177
640.41	ECIS	.....	129	645.5(D)(6)(c)	HNIR	.....	178
640.41	QLGD	.....	345	645.5(D)(6)(c)	NYTT	.....	282
640.41	QLHN	.....	345	645.5(D)(6)(c)	QAYK	.....	320
640.41	QLIW	.....	345	645.5(D)(6)(c)	QPOR	.....	351
640.41	QLKH	.....	346	645.5(D)(6)(c)	QPTZ	.....	355
640.41	RTRT	.....	375	645.7	XHEZ	.....	458
640.42(A)	ELBZ	.....	132	645.10	NISD	.....	258
640.42(A)	ZJCZ	.....	487	645.11	YEDU	.....	472
640.42(B)	DUZX	.....	119	645.15	NWGQ	.....	277
640.42(B)	ELBZ	.....	132	645.17	NWGQ	.....	277
640.42(B)	PWIP	.....	317	645.17	QPQY	.....	353
640.42(B)	QAYK	.....	320	Article 647 - Sensitive Electronic Equipment			
640.42(B)	ZJCZ	.....	487	647.4(A)	DIVQ	.....	107
640.42(C)	DUZX	.....	119	647.4(A)	DKUY	.....	110
640.42(C)	ELBZ	.....	132	647.4(A)	QEUY	.....	332
640.42(C)	PWIP	.....	317	647.4(A)	WIAX	.....	432
640.42(C)	QAYK	.....	320	647.7(A)(1)	KCXS	.....	223
640.42(C)	ZJCZ	.....	487	647.7(B)	RTRT	.....	375
640.42(E)	ELBZ	.....	132	Article 650 - Pipe Organs			
640.42(E)	ZJCZ	487	650.1	AZSQ	76
640.43	QCRV	329	650.1	PWHZ	316
640.44	CYIV	98	650.6	ZKST	490
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645.1	NWGQ	277	650.6(D)	OANZ	282
645.4(1)	NISD	258	650.7	ZODZ	498
645.4(2)	ACVS	62	Article 660 - X-Ray Equipment			
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645.4(2)	LZFE	246	660.4(B)	RTRT	375
645.4(3)	NWGQ	277	660.4(B)	ZJCZ	487
645.4(3)	NWIN	279	660.5	DIVQ	107
645.4(3)	QQGQ	.....	356	660.5	WGEU	.....	429
645.4(5)	BXUV	.....	84	660.5	WHXS	.....	431
645.5(B)	ELBZ	132	660.5	WIAX	432
645.5(C)	DVPJ	121	660.5	WJAZ	435
645.5(C)	EMRB	138	660.5	WJQR	436

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660.35	NYQD	281	675.8(C)	WIAX	432
660.37	NYQD	281	675.8(C)	WJAZ	435
660.48	RTRT	375	675.11	NMTR	266
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665.12	WGEU	429	675.11(D)	NMTR	266
665.12	WHXS	431	675.17	AXGV	73
665.12	WIAX	432	675.17	AXUT	74
665.12	WJAZ	435	675.17	QLGD	345
665.12	WJQR	436	675.17	QLHN	345
665.21	NITW	259	675.17	QLIW	345
665.26	KDER	224	675.17	QLKH	346
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668.11(C)	KDER	224	675.17	RTRT	375
668.15	KDER	224	Article 680 - Swimming Pools, Fountains and Similar Installations		
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669.3	QQIJ	357	680.5	KCXS	223
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669.9	JDDZ	211	680.21(A)(1)	DYBY	125
669.9	JDRX	214	680.21(A)(1)	DYIX	125
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670.2	GPNY	173	680.21(A)(1)	DZLR	127
670.2	NITW	259	680.21(A)(1)	DZYR	127
670.2	TETZ	396	680.21(A)(1)	PJAZ	301
670.2	TWKH	402	680.21(A)(1)	DWTT	122
670.2	TWPV	402	680.21(A)(3)	DXAS	124
670.2	TWRF	402	680.21(A)(3)	DXHR	124
670.2	TWSP	402	680.21(A)(3)	DXOQ	124
670.2	TWTZ	403	680.21(A)(3)	AXUT	74
670.2	TWWT	403	680.21(A)(5)	ELBZ	132
670.3	NITW	259	680.21(A)(5)	ZJCZ	487
670.4(A)	PVVA	314	680.21(A)(5)	WCSX	426
670.4(C)	DIVQ	107	680.21(B)	DKUY	110
670.4(C)	JDDZ	211	680.22(A)(4)	KCXS	223
670.4(C)	JDRX	214	680.22(A)(4)	DKUY	110
Article 675 - Electrically Driven or Controlled Irrigation Machines			680.22(B)	DKUY	110
675.4(B)	OFFY	284	680.22(B)	KCXS	223
675.4(B)	OFJZ	284	680.22(C)(2)(2)	GPRT	174
675.4(B)	ZMHX	492	680.22(C)(4)	DKUY	110
675.4(C)	DWMU	122	680.22(C)(4)	KCXS	223
675.4(D)	OFJZ	284	680.23	WBDT	423
675.4(D)	QCRV	329	680.23(A)(2)	WDGV	427
675.6	NITW	259	680.23(A)(3)	KCXS	223
675.8(A) Exc	DIVQ	107	680.23(A)(8)	DKUY	110
675.8(A)	NITW	259	680.23(A)(8)	KCXS	223
675.8(A)	NKCR	263	680.23(A)(8)	WBDT	423
675.8(A)	NKJH	264	680.23(B)	WDGV	427
675.8(A)	NLDX	265	680.23(B)(2)(b)	WBDT	423
675.8(A)	NLRV	265	680.23(C)	WCRY	425
675.8(A)	NMFT	265	680.23(D)	WBDT	423
675.8(B)	DIVQ	107	680.23(E)	WBDT	423
675.8(B)	WHXS	431	680.23(F)	WBDT	423
675.8(B)	WIAX	432	680.23(F)	DXOQ	124
675.8(B)	WJAZ	435	680.23(F)	DYBY	125
			680.23(F)	DYIX	125

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680.23(F)	DZYR	127	680.42(A)(2)	AXUT	74
680.23(F)	FJMX	151	680.42(A)(2)	DKUY	110
680.23(F)	FKHU	152	680.42(A)(2)	ELBZ	132
680.23(F)	PJAZ	.....	301	680.42(A)(2)	KCXS	.....	223
680.23(F)(1)	AWEZ	.....	72	680.42(A)(2)	ZJCZ	.....	487
680.23(F)(1)	DZKT	.....	126	680.43 Exc	WBYQ	.....	424
680.24(A)	DZKT	.....	126	680.43 Exc	WCZW	.....	426
680.24(A)	WCEZ	.....	425	680.43(A)	RTRT	.....	375
680.24(A)(1)	WCEZ	.....	425	680.43(A)(2)	DKUY	.....	110
680.24(B)	WDGV	.....	427	680.43(A)(2)	KCXS	.....	223
680.24(B)(1)	WDGV	.....	427	680.43(A)(3)	DKUY	.....	110
680.25(A)	DXOQ	.....	124	680.43(A)(3)	KCXS	.....	223
680.25(A)	DYBY	.....	125	680.43(B)(2)	WBDT	.....	423
680.25(A)	DYIX	.....	125	680.43(D) Exc 2	WBYQ	.....	424
680.25(A)	DZKT	.....	126	680.43(D) Exc 2	WCZW	.....	426
680.25(A)	DZLR	.....	127	680.44	DKUY	.....	110
680.25(A)	DZYR	.....	127	680.44	KCXS	.....	223
680.25(A) Exc	DXUZ	.....	125	680.44(A)	WCZW	.....	426
680.25(A)	FJMX	.....	151	680.44(B)	WBYQ	.....	424
680.25(A)	FKHU	.....	152	680.50	AWEG	.....	72
680.26(B)	DYIX	.....	125	680.51(A)	KCXS	.....	223
680.26(B)	DYWV	.....	126	680.51(A)	WBDT	.....	423
680.26(B)	KDER	.....	224	680.51(A)	WDGV	.....	427
680.26(B)(2)(b)(3)	ZMVV	.....	495	680.51(C)	WBDT	.....	423
680.26(B)(4) Exc	WBDT	.....	423	680.52(A)	WCEZ	.....	425
680.26(B)(6)	WCSX	.....	426	680.52(A)	WDGV	.....	427
680.26(B)(6)	WDDJ	.....	426	680.52(B)	WCRY	.....	425
680.26(B)(6)(a)	WCSX	.....	426	680.52(B)(2)	WCRY	.....	425
680.26(B)(6)(b)	WBRR	.....	424	680.56(A)	DKUY	.....	110
680.26(C)	DYBY	.....	125	680.56(A)	KCXS	.....	223
680.26(C)	KDER	.....	224	680.56(B)	ZJCZ	.....	487
680.26(C)	WDUT	.....	427	680.56(C)	WCRY	.....	425
680.26(E)	WBRR	.....	424	680.56(D)	AXUT	.....	74
680.27(A)(1)	UEAY	.....	406	680.56(D)	ELBZ	.....	132
680.27(A)(2)	DXOQ	.....	124	680.56(D)	RTRT	.....	375
680.27(A)(2)	DYBY	.....	125	680.56(D)	ZJCZ	.....	487
680.27(A)(2)	DYIX	.....	125	680.57(A)	UXYT	.....	413
680.27(A)(2)	DYWV	.....	126	680.57(B)	DKUY	.....	110
680.27(A)(2)	DZKT	.....	126	680.57(B)	KCXS	.....	223
680.27(A)(2)	DZLR	.....	127	680.57(C)(1)	UXYT	.....	413
680.27(A)(2)	DZYR	.....	127	680.57(C)(2)	UXYT	.....	413
680.27(A)(2)	WBDT	.....	423	680.58	DKUY	.....	110
680.27(A)(2)	WCEZ	.....	425	680.58	KCXS	.....	223
680.27(A)(2)	WCRY	.....	425	680.60	PIDF	.....	299
680.27(A)(3)	WBDT	.....	423	680.61	PIDF	.....	299
680.27(B)(1)	WDDJ	.....	426	680.62	PIDF	.....	299
680.27(B)(2)	DKUY	.....	110	680.62(A)	KCXS	.....	223
680.27(B)(2)	KCXS	.....	223	680.62(A)(1)	PIDF	.....	299
680.31	KCXS	.....	223	680.62(A)(2)	PIDF	.....	299
680.31	WCSX	426	680.62(E)	DKUY	110
680.32	DKUY	110	680.62(E)	KCXS	223
680.32	KCXS	223	680.70	NCHX	256
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680.40	WBYQ	424	680.71	KCXS	223
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682.13	QPMU	351	690.14	WJBE	435
682.14	WIAX	432	690.14(D)	QIKH	342
682.14(A)	DIVQ	107	690.15	DIVQ	107
682.14(A)	WGEU	429	690.15	QIIO	341
682.14(A)	WHXS	431	690.15	WGEU	429
682.14(A)	WJAZ	435	690.15	WHXS	431
682.15	DKUY	110	690.15	WHXX	432
682.15	KCXS	223	690.15	WIAX	432
682.23(C)	KDER	224	690.15	WIBC	433
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690.2	QHYZ	336	690.15	WJBE	435
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690.2	QIGU	339	690.17	QIIO	341
690.2	QIGZ	340	690.17	WGEU	429
690.2	QIIA	340	690.17	WHXS	431
690.2	QIIO	341	690.17	WIAX	432
690.2	QIJL	341	690.17	WJAZ	435
690.2	QIKA	341	690.17	WJQR	436
690.2	QIKH	342	690.31(A)	ZKLA	489
690.4(C)	QIGU	339	690.31(B)	TYLZ	404
690.4(C)	QIGZ	340	690.31(B)	ZGZN	485
690.4(D)	QHWJ	336	690.31(B)	ZKLA	489
690.4(D)	QHYZ	336	690.31(C)	QPMU	351
690.4(D)	QHZK	336	690.31(C)	ZJCZ	487
690.4(D)	QHZQ	337	690.31(C)	ZKLA	489
690.4(D)	QIBP	338	690.31(F)	ZMVV	495
690.4(D)	QIGU	339	690.35(C)	QIKH	342
690.4(D)	QIGZ	340	690.35(D)	ZKLA	489
690.4(D)	QIIA	340	690.35(G)	QIKH	342
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690.5(A)	QIBP	338	690.51	QHZU	338
690.5(A)	QIIO	341	690.51	QIGU	339
690.5(A)	QIKH	342	690.51	QIGZ	340
690.6(B)	QHYZ	336	690.51	QIIA	340
690.6(C)	DIVQ	107	690.52	QHYZ	336
690.6(C)	QIIO	341	690.52	QIGU	339
690.6(C)	WGEU	429	690.52	QIGZ	340
690.6(C)	WHXS	431	690.53	DIUR	107
690.6(C)	WIAX	432	690.53	JFGA	215
690.6(C)	WJQR	436	690.53	QICP	338
690.6(D)	QIIO	341	690.53	QIJL	341
690.9(C)	JDDZ	211	690.53	WHXX	432
690.9(C)	JDRX	214	690.53	WIBC	433
690.9(C)	JFGA	215	690.53	WJBE	435
690.9(D)	DIVQ	107	690.60	QHYZ	336
690.9(D)	JDDZ	211	690.60	QIKH	342
690.10(A)	QIKH	342	690.64(B)(3) Exc	QIIO	341
690.10(C)	QIKH	342	690.64(B)(5)	DIVQ	107
690.13	WHXX	432	690.64(B)(6)	DIVQ	107
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690.72(B)(2)	QIBP	338	695.14(E)	BXUV	84
690.72(B)(3)	QIKH	342	695.14(E)	DXAS	124
690.74	ZMVV	495	695.14(E)	DXHR	124
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692.1	IRGN	203	695.14(E)	DYBY	125
692.1	IRGZ	205	695.14(E)	DYIX	125
692.1	IUXX	205	695.14(E)	DYWV	126
692.1	QIKH	342	695.14(E)	FHIT	150
692.6	IRGN	203	695.14(E)	FHIY	150
692.6	IRGZ	205	695.14(E)	FHJR	151
692.10(A)	IRGZ	205	695.14(E)	PPKV	306
692.17	DIVQ	107	Article 700 - Emergency Systems			
692.17	WGEU	429	700.6(A)	WPTZ	438
692.17	WHXS	431	700.6(A)	WPWR	439
692.17	WIAX	432	700.6(B)	WPVQ	439
692.17	WIOV	434	700.6(C)	WPTZ	438
692.17	WJAZ	435	700.6(C)	WPWR	439
692.59	WPTZ	438	700.7(D)	KDAX	224
692.59	WPWR	439	700.9(D)(1)(2)	FHIT	150
692.59	WPXT	439	700.9(D)(1)(3)	XCLF	456
692.59	WPYV	440	700.9(D)(1)(4)	BXUV	84
692.60	IRGZ	205	700.9(D)(1)(6)	FHIT	150
692.62	QIKH	342	700.9(D)(1)(6)	FHJR	151
692.65(B)(3) Exc	QIIO	341	700.9(D)(2)	BXUV	84
692.65(B)(5)	DIVQ	107	700.12(A)	BBHH	78
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695.3(B)(1)	FTSR	167	700.12(B)(2)	FTSR	167
695.4(A)	QYZS	365	700.12(B)(4)	BBHH	78
695.4(A)	QZGR	365	700.12(B)(6)	FTSR	167
695.4(A)	QZKE	365	700.12(C)	YEDU	472
695.4(B)	QYZS	365	700.12(C)	YEET	473
695.4(B)	QZGR	365	700.12(E)	IRGN	203
695.4(B)	XNVE	464	700.12(E)	IRGZ	205
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695.6(B)(3)	FHIY	150	701.7(B)	WPVQ	439
695.6(B)(3)	FHJR	151	701.7(C)	WPTZ	438
695.6(C)(1)	QXZF	364	701.7(C)	WPWR	439
695.6(C)(2)	QXZF	364	701.11(A)	BBHH	78
695.6(E)	DXAS	124	701.11(B)(1)	FTSR	167
695.6(E)	DXHR	124	701.11(B)(2)	FTSR	167
695.6(E)	DXOQ	124	701.11(B)(4)	BBHH	78
695.6(E)	DYBY	125	701.11(B)(5)	FTSR	167
695.6(E)	DYIX	125	701.11(C)	YEDU	472
695.6(E)	DYWV	126	701.11(C)	YEET	473
695.6(E)	PPKV	306	701.11(E)	IRGZ	205
695.6(F)	ZMVV	495	701.11(G)	FTBR	163
695.10	QXZF	364	Article 702 - Optional Standby Systems			
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UL also serves the interests of the public by conducting research investigations -- both for its own use and use by others -- on products or materials to help identify safety concerns and to assist in the development of appropriate safety requirements. This research is particularly useful when new technologies emerge or new safety concerns are explored. UL's research expertise and facilities are available to manufacturers, trade associations, government and other groups. Contact UL's Customer Experience Center at cec.us@us.ul.com or 1.877.UL.HELPS (1.877.854.3577) for referral to the appropriate engineering staff.

Verification Services — Commercial Inspection, Testing and Auditing

UL Verification Services offers expertise in commercial testing, inspection and auditing that is recognized and respected around the world. Currently, UL Verification Services provides support to the appliance, high-tech, lighting, and retail industries through our global footprint, technical expertise, commitment to quality and unmatched customer service. Our full range of technical services support manufacturing business operations from initial design through prototyping and into final production and enhance retail or go-to-market supply chain quality management operations. For more information, Contact UL's Customer Experience Center at cec.us@us.ul.com or 1.877.UL.HELPS (1.877.854.3577) or e-mail cits@us.ul.com.

UL Information Services

UL's Technical Information Services

Manufacturers, AHJs and other groups look to UL as a uniquely broad and accessible source of technical information in areas such as product testing and certification, domestic and international standards, international compliance requirements, and quality system registration. UL provides a variety of technical information services.

Online Certifications Directory

UL's Online Certifications Directory of UL certified products can be accessed at www.ul.com/database.

UL White Book and Product Directory CDs

UL's White Book and CD and the Product Directory CDs below are published annually. Order by visiting <http://ul.com/global/eng/pages/offerings/perspectives/regulator/electrical/publications/>.

Following is a list of the Product Directory CDs currently available from UL and the distribution months.

<u>Annual Product Directory CDs</u>	<u>Month Distributed</u>
Building Materials, Fire Protection Equipment, Roofing Materials & Systems and Fire Resistance CD	March
Guide Information for Electrical Equipment - the White Book (Print or CD)	April
Guide Information for Canadian Certified Equipment - the Canadian White Book	June
Heating, Cooling, Ventilating & Cooking Equipment, Food Safety Equipment, Plumbing & Associated Products and Flammable & Combustible Liquids & Gases Equipment CD	October

UL's Website

Visit www.ul.com for information on UL's products and services. Topics include:

- UL Marks
- UL product testing and certification, facility registration, and related services
- Seminars
- Technical information resources, such as Standards (including access to the Standards Electronic Bulletin Board System) and UL's Online Certifications Directory
- UL news and activities, including the latest news releases
- Information for AHJs, consumers and retailers
- UL Standards CSDS
- UL Marking Guides

UL Standards Development Process – Potential Roles for AHJs

Background

UL provides global conformity assessment programs and services. In addition to being the leader in product safety certification and conformity assessment services, UL is a world leader in standards development. Through more than a century of involvement in the standards and conformity assessment community, UL is recognized for its unrivaled technical expertise in the areas in which it develops standards. UL's Standards for Safety are used to investigate and certify products and systems. These standards are used by manufacturers to help design products and systems to meet the requirements for certification, by AHJs who reference the standards for products and systems used in their jurisdictions, by code development organizations that adopt and reference UL Standards for Safety, and by certification organizations that apply UL requirements for product evaluations.

Content/Scope of a UL Standard for Safety

UL Standards are typically identified as Standards for Safety and cover reasonably foreseeable risks associated with a product. Limitations applicable to the products covered by the standard are delineated in the Scope.

UL Standards are intended to:

- Identify the requirements used for the investigation of products and provide consistency in the application of these requirements.
- Provide guidance for the development of products by manufacturers.
- Provide requirements compatible with nationally recognized installation codes so that AHJs may judge their acceptability under installation codes. In addition, UL Standards may also be used by AHJs as a basis for judging material or equipment outside the scope of the document by reason of size, rating, one of a kind, or the like.

UL Standards are developed under a procedure that provides for participation, review, and comment from groups representing a broad range of interests including industry, government, insurance groups, consumers, other interested parties, and the general public. This procedure takes into consideration the needs and opinions of a wide variety of interests concerned with the subject matter of the standard.

The factors that impact UL's decision to develop a new standard or maintain existing standards include:

- Request for UL product certification in a new area;
- Request by an AHJ, government agency or consumer organization in which a new need is identified;
- Change in nationally recognized codes;
- Reports from the field pertaining to products currently in use;
- New technology not contemplated in current requirements; or
- Harmonization with regional or international standards.

Generally, UL standards are additionally recognized as American National Standards (ANSI).

Authorities Having Jurisdiction (AHJs) and Consumer Involvement

To promote a balance of input to its standards development process, UL has intensive recruitment and outreach programs to encourage AHJs and consumers to participate on Standards Technical Panels (STP). UL offers process training and funding for attendance at STP meetings. Contact the STP Project Manager (available at <http://ulstandardsinfolnet.ul.com>) for more information in advance of a meeting.

Essential Elements of the STP Process for Consensus Standards

The UL standards development process for consensus standards is based on the essential elements of ANSI's standards development criteria. The process incorporates the following concepts:

Continuous maintenance and open participation

UL is continually open to input from the various users of UL Standards and other interested groups addressing particular issues. Input is provided by industry, consumer groups, insurance representatives, and government agencies, as well as by AHJs, trade associations, and advisory groups.

UL encourages interested parties to actively participate in UL's standards development process by becoming a member of a specific STP. UL strives to achieve balance among the interest categories on the STPs. All participation takes place electronically through the UL Collaborative Standards Development System (CSDS).

STP meetings are held when the STP Chair decides that there is a need to convene the consensus body either because there are proposals to discuss or comments to resolve. Meetings can also be considered if requested by STP members. STP meetings that result from proposals or are otherwise convened by UL are open. All STP meetings are posted on the UL CSDS.

In addition, UL solicits comments from UL's Standards subscribers and public review participants.

Anyone materially affected by a UL Standard is encouraged to submit proposals. The on-line Proposal Request Form is used to formally submit proposals for UL Standards using UL CSDS. In addition to providing rationale for the proposal, the proposed wording for the requirement is to be shown in legislative format.

Consensus body review and ballot

Proposals to develop or revise a standard are balloted to the STP, the consensus body. Proposals must reach consensus before UL publishes the requirements. Consensus is achieved when more than 50 percent of the STP returns a ballot and approval is granted by two-thirds of those voting minus abstentions, negatives without comment, and negatives based on material not covered by the ballot.

UL Standards and proposed revisions are balloted for a minimum of 30 days.

Public review

UL provides public notice of, and the opportunity to comment on, all proposals. UL notifies the public of its intent to develop a new standard, revise a standard, or publish approved requirements through notices in *ANSI Standards Action*.

Public review periods are typically 45 days and are done in parallel with the consensus body review and ballot phase.

Comment resolution and circulation of substantive changes

All comments received on proposals are given due consideration. Comments received during the consensus process can be handled one of four ways: (1) a response drafted by UL, (2) a response drafted based on discussions by the STP at a comment resolution meeting, (3) a response drafted by a task group, or (4) a response drafted by the original submitter of the proposal.

The disposition of comments is shared with participants, and substantive revisions to proposals resulting from the comments, along with continuing objections, are circulated to the STP and subscribers to give STP members the opportunity to change their vote. All comments are made available via UL CSDS.

A two-week circulation is provided for comments with no substantive changes. A four-week circulation is provided for comments that result in proposal revision.

Consensus is verified during this phase.

The submitter of a proposal that lacks consensus may withdraw the proposal at any time in the process. When a proposal is withdrawn, the STP will be notified, and the reason for withdrawal will be provided, when appropriate.

Opportunity for appeal

STP members and other participants with continuing objections have the right to appeal the STP approval of proposals prior to UL publishing the revisions.

Continuing objectors may appeal the decision of the STP on the basis of a procedural complaint. Technical decisions approved by the STP are not grounds for appeal and will not be heard.

All valid appeals will be heard through a standing Appeals Panel. Details on the process are available at <http://ulstandardsinfonet.ul.com>.

Publication of approved material

UL notifies STP members and provides public notice when proposals have completed the consensus process.

UL undergoes regular and extensive audits and has been awarded the right to be an ANSI Audited Designator. As such, UL does not need to submit its standards to the ANSI Board of Standards Review for approval; UL can self-declare and move approved materials directly to publication.

Roles of STP Members

There are no membership dues associated with STPs, and anyone interested in membership is encouraged to complete an STP application (refer to www.ulstandardsinfonet.ul.com or the STP application included on the Electrical Toolkit). The STP Chair appoints members to the STP based on completed applications and criteria outlined in UL's Approved Regulations Governing ANSI/UL Standards Technical Panels (<http://ulstandardsinfonet.ul.com/stp/regulations.html>). The role of an STP member is to fully participate in the consensus process by commenting and voting on proposals, helping to resolve comments, and submitting new proposals. Continued membership is contingent on active participation; however, meeting attendance is optional. STP members may also participate on task groups.

UL CSDS Participation

The UL CSDS affords subscribers to UL's Standards Service participation in the standards development process via on-line access to the latest proposals under consideration. This includes all stages of the proposal review and comment resolution process, as well as STP meeting reports, which include a summary of the discussions that took place at the STP meeting.

STP members have a complementary subscription to UL's Standards Service for the standards covered by the STP. STP members have an additional level of access to: any documents for preliminary review to obtain initial input on a concept, with or without specific proposals; agendas for STP meetings, which provide a description of the meeting topics, with rationale and impact statements for specific proposals, when appropriate; and a ballot feature, when appropriate, for specific proposals to issue or revise a UL Standard.

There is no paper distribution involved in UL's standards development process. All participation is through CSDS so participants must have access to a computer, e-mail, and the Internet.

UL Standards Publications

Standards for Safety Catalog – UL's Standards for Safety Catalog is available online at <http://ulstandardsinfonet.ul.com/catalog/stdscatframe.html>

To Order Standards Services

To order UL Standards, Standards Subscription Services and other Standards publications from the U.S. or Canada, call toll-free 1.888.UL.33503 or 1.888.853.3503. Callers from other countries can dial Int+415.352.2168. Or fax at 888.853.3512. For more information on ordering UL Standards, visit <http://ulstandardsinfonet.ul.com>.

UL StandardsInfoNet

UL StandardsInfoNet – the Internet website for information on UL Standards activities.

UL StandardsInfoNet provides access to UL's current Standards for Safety Catalog and Product Index.

UL StandardsInfoNet provides up-to-date information pertaining to UL's various Standards activities, such as information about new editions, revisions, proposed Standards, Bulletins, and Outlines of Investigation; a list of UL Standards approved by ANSI and the DoD; UL/CSA and UL/IEC harmonized Standards; the scope of each Standard and Outline of Investigation; meeting announcements, and the like.

UL StandardsInfoNet can be accessed at no cost by setting your browser's URL to:
<http://ulstandardsinfonet.ul.com>.

Regulatory Services Staff

To contact UL Regulatory Services staff members, call 1.800.595.9844 or e-mail ulregulatoryservices@us.ul.com or visit www.ul.com/codeauthorities. For more detailed contact information including contact names, phone, fax and e-mail addresses, visit the code authorities-website at <http://www.ul.com/global/eng/pages/offerings/perspectives/regulator/contacts/>.

Appendix A

UL Marking Guides and Application Guides

UL has developed these marking guides to assist AHJs and installers in understanding the meaning and location of markings on various UL Listed products. These products are intended to be installed in accordance with the NEC® and their UL Listing.

UL has developed these application guides to assist code and inspection authorities, electric utilities, contractors, installers, users, system designers, and other interested parties in understanding the basic components of alternative energy systems and lightning protection systems and the applicable codes and standards in order to facilitate a reasonably safe and code-compliant installation.

The following UL Marking Guides and Application Guides are included in this appendix:

1. Dead-front Switchboards
2. Electrical Heating and Cooling Equipment
3. Luminaires
4. Molded Case Circuit Breakers
5. Panelboards
6. Swimming Pool Equipment, Spas, Fountains and Hydromassage Bathtubs
7. Wire & Cable
8. Alternative Energy Equipment and Systems Application Guide
9. Lightning Protection Application Guide
10. Green Construction Application Guide

The UL Guide Information for product categories referenced in the above marking guides is included within the UL White Book.



Marking and Application Guide

DEAD-FRONT SWITCHBOARDS

Dead-Front Switchboards
Marking and Application Guide

JANUARY 2013

PREFACE

UL developed the Dead-Front Switchboard Marking Guide for electrical inspectors, electric utilities, contractors, installers, users, designers, and other interested parties to aid in understanding deadfront switchboards and the applicable codes and standards in order to facilitate a reasonably safe and code-compliant installation of switchboards used in ordinary locations, rated 600 volts or less. These switchboards are intended to be installed in accordance with the *National Electrical Code*® (*NEC*®) and their listing. These markings are required by UL 891, and are part of the listing.

The Table of Contents lists the main headings and their page numbers. The Index gives an alphabetical list of specific items and the section numbers where information about them can be found. Marking guides are available for Panelboards and Molded Case Circuit Breakers at www.ul.com/markingguides or in Appendix A of the UL White Book.

Complete information regarding the provision of markings and instructions for these switchboards is contained in the Standard for Switchboards, UL 891. References to the *National Electrical Code*® (*NEC*®) are to the 2011 edition.

UL Marking and Application Guides are updated as necessary due to new product development, changes in the codes, or the need for clarification. To confirm the current status of any UL Marking Guide, please consult the Code Authorities page of the UL Web Site at <http://www.ul.com/codeauthorities>.



Your comments or suggestions are welcome and appreciated. They should be sent to:

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333 Pfingsten Road
Northbrook, IL 60062
ulregulatoryservices@ul.com
800-595-9844

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INTRODUCTION

USE OF THIS GUIDE

This guide is intended to assist regulatory authorities, designers, and installers in determining the suitability of deadfront switchboards in a particular installation and use, and to address concerns related to fire, shock, and mechanical hazards.

Products are Listed or Classified by UL under an appropriate product category. A four-letter code (shown in parenthesis) following every category title in this guide is the UL product category code designation.

Each UL product category code provides a direct link to the Guide Information for the product category. The Guide Information includes the scope of the products covered, information relating to limitations or special conditions applying to the product, the requirements used for the investigation of the products, installation and use information, and information on product markings and the UL Mark to be used on the product. Additional information on marking requirements can be found in the guide information for Dead-Front Switchboards (WEVZ), which is located in the UL White Book and online at www.ul.com/database.

The product markings identified in this guide do not include every possible marking that could be provided either on a product or in its installation or operation instructions. The purpose of these markings is to provide you with an indication of the type of text and location of markings that address features that may be critical in determining if a product is certified and / or if it is installed correctly. Refer to the specific Guide Information for the product category for additional marking information.

The numbering for code sections used in this document may change as the specific code is updated.

Additional information can be found at www.ul.com.

INFORMATION ON LISTING VERSUS CLASSIFICATION

Most codes and regulations require the certification of power distribution equipment to applicable safety-related standards. They also may require this equipment to be certified to energy performance standards as well. Products that are certified to safety-related standards have been evaluated with regard to all reasonably foreseeable safety-related hazards, including fire, electrical shock and mechanical hazards. Such products are termed “UL Certified” or “UL Listed.” Products that are certified to a limited range of hazards, or for use under specific conditions are termed “UL Classified.”

It is important to distinguish the difference between “UL Certified” or “UL Listed” and “UL Classified” and the relation these terms have with the term “listed,” as used in various codes. The term “listed” in the codes generally indicates that the product is required to be evaluated in accordance with the appropriate standard(s) by an independent third party certification organization such as UL. The term “listed” in the codes should not be confused with the term “UL Listed,” as explained above. It is important to recognize that not all certification agencies make this distinction in their certification services.

INFORMATION ON UL MARKS

There are several types of UL Marks that can be found on power distribution equipment. General information on each of these Marks is provided below. Each has its own specific meaning and significance. The only way to determine if a product has been certified by UL is to look for the UL Mark on the product itself.

The UL Mark on a product means that UL has tested and evaluated representative samples of that product and determined that they meet the requirements in the applicable standard(s). Under a variety of UL programs, certified products are periodically checked by UL at the manufacturing facility to determine that they continue to comply with the standard(s).

The UL Marks may only be used on, or in connection with products certified by UL, and under the terms of a written agreement between the manufacturer and UL.

UL Listing Mark

This is one of the most common UL Marks. If a product carries this Mark, it means UL found that representative samples of this product met UL's *safety* requirements. These requirements are primarily based on UL's own published Standards for Safety, or other recognized third party standards. The UL Listed Mark includes the UL symbol, the word "Listed," the product or category name, and a control number assigned by UL.



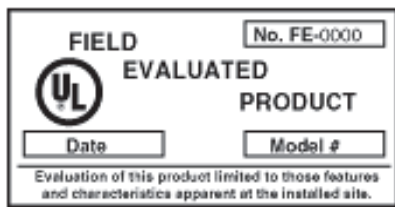
UL Classification Mark

This Mark appears on representative samples of products that UL has evaluated but only with respect to specific properties, a limited range of hazards, or suitability for use under limited or special conditions. The UL Classified Mark includes the UL symbol, the word "Classified," a statement of the scope of evaluation, the product or category name, and a control number assigned by UL.



FIELD EVALUATIONS

You may encounter situations in which you are unable to determine if a product has been listed by a third-party organization. Or in other situations you might encounter a product bearing a listing label that may have been modified in the field, and now you question whether or not the product still complies with the applicable standard. UL offers a field evaluation service that provides data to assist you in making your decision whether to accept the product and/or approve the installation. Anyone directly involved with a product – including manufacturers, owners, contractors, and regulatory authorities – can request a Field Evaluation. Detailed information for this program can be found on UL's Web site at www.ul.com/field.



1. GENERAL INFORMATION

UL lists manufacturers of dead-front switchboards under the category of “Dead-Front Switchboards” (WEVZ) in the UL Online Certification Directory at www.ul.com/database.

This Directory also contains names of manufacturers who are authorized to label equipment similar in appearance to dead-front switchboards under the following categories:

Circuit Breaker and Metal-Clad Switchgear — over 600 volts (DLAH)

Switchgear Assemblies, Metal Enclosed, Low-Voltage Power Circuit Breaker Type (WUTZ)

The evidence of Listing is the UL Listing Mark on the product. The Listing Mark for switchboards includes the name and/or symbol of UL, together with the word “Listed,” a control number and one of the following product names as appropriate: “Dead-Front Switchboard Section,” “Switchboard Interior,” or “Switchboard Enclosure.”

The Listing Mark for Dead-Front Switchboard Sections contains the marking “_____ of _____,” in which the first space is marked with a number indicating the position that the section occupies in the series of sections which constitute the switchboard, and the second space is marked with the total number of sections (both Listed and non-Listed) in the switchboard. A single section switchboard is marked 1 of 1. The section on the left side when facing the front of the switchboard is marked as position one of the series.

A switchboard section mounted on top of one or more sections is marked “_____ T” where the blank is filled with the number of the initial section covered. A switchboard enclosure (pull section) may be included in the numbering sequence if it is located at either end of the switchboard. The pull section is included in the numbering sequence if located between switchboard sections.

A switchboard section omitting one side is marked to indicate the catalog number of a separate side panel that should be ordered, or the catalog numbers of stock sections to which it is intended to be connected.

The Listing Mark is applicable only to the section so marked; it does not cover other sections included in the complete switchboard. A switchboard may be shipped from the factory incorporating both Listed and non-Listed sections. The non-Listed sections have not been evaluated by UL.

The basic Standard used to investigate products in this category is the Standard for Switchboards, UL 891.

Switchboard markings may be molded, die-stamped, paint stenciled, stamped, etched metal that is permanently secured, or on a label secured by adhesive. Some markings may be located on a wiring diagram in a pocket on the switchboard.

2. GLOSSARY

ACCESSIBLE, FRONT - An enclosure in which incoming and outgoing field termination points are accessible from the front. Other connections shall be permitted to be rear or side accessible. If necessary, a limited number of devices shall be permitted to be removed to achieve this accessibility.

ACCESSIBLE, REAR - An enclosure in which all incoming and outgoing field termination points are accessible from the rear. Other connections shall be permitted to be front or side accessible. If necessary, a limited number of barriers or covers shall be permitted to be removed to achieve this accessibility.

AMPACITY - The current in amperes a conductor can carry continuously under the conditions of use without exceeding its temperature rating.

BARRIER - A partition for the insulation or isolation of electric circuits or electric arcs.

BONDING - The permanent joining of metallic parts to form an electrically conductive low impedance path that will assure electrical continuity and the capacity to conduct safely any current likely to be imposed.

BUS - A conductor, or group of conductors, that serves as a common connection for two or more circuits.

BUS, BRANCH — A bus that originates at a section bus and terminates in one or more overcurrent devices.

BUS, GROUND – A bus to which the equipment grounding conductors from individual pieces of equipment are connected and which, in turn, is connected to the grounding electrode conductor at one point. It provides a continuous ground in multiple equipment sections through which it passes. See Figure 2.1.

BUS, NEUTRAL – A bus having the appropriate number of terminals to provide for the connection of the neutral line and load conductors. See Figure 2.1.

BUS, SECTION — That portion of the bus structure that serves one or more overcurrent devices in the switchboard section and comprises that part of the bus between the supply bus and branch bus. See Figure 2.1.

BUS, SPLICE — A bus that electrically connects switchboard sections. See Figure 2.1.

BUS, SUPPLY — A bus that is intended primarily for conducting electric power from the source to the main section of a switchboard. See Figure 2.1.

BUS, THROUGH — A bus that extends through a switchboard section. It is sometimes called a horizontal, cross or main bus. See Figure 2.1.

CIRCUIT BREAKER - A device designed to open and close a circuit by non-automatic means, and to open the circuit automatically on a predetermined overcurrent, without injury to itself when properly applied within its rating.

CIRCUIT BREAKER, MOLDED CASE - A circuit breaker which is assembled as an integral unit in a supporting and enclosing housing of insulating material.

CONTINUOUS CURRENT - The amount of current a conductor, a device or a piece of equipment can carry continuously for an indefinite period of time without exceeding its allowable temperature rise.

CURRENT RATING - The designated maximum direct or alternating current in rms amperes at rated frequency that a device can carry continuously under specified conditions.

DEAD-FRONT SWITCHBOARD - A switchboard which has no exposed live parts on the front.

DEVICE - A component of an electrical system that is intended to carry or control, but not utilize, electrical energy.

DISCONNECTING MEANS – A device, or a group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

DOUBLE-ENDED SWITCHBOARD (Multiple Source) — A switchboard construction that provides for the connection of two supply sources, such as a utility service and an on-site generator. See Figures 2.2 and 2.3 for typical examples.

FUSE - A protective device which opens by the melting of a current-sensitive element during specified overcurrent conditions.

FUSIBLE SWITCH - A switch in which one or more poles have a fuse in series in a composite unit.

I^2t (AMPERE SQUARED SECONDS) - An expression related to the circuit energy as a result of current flow. The “ I^2 ” stands for the square of the effective (rms) let-through current and the “ t ” stands for the time of current flow in seconds. “ I^2t ” is a common expression for the circuit energy between the initiation of the fault current and the clearing of the circuit.

INTERLOCK - An electrical or mechanical component actuated by the operation of a device or other means, with which it is directly associated to govern succeeding operations of the same or allied devices.

INTERRUPTING RATING – The highest current at rated voltage that a device is intended to interrupt under standard test conditions.

MAIN DEVICE – A single device that disconnects all ungrounded conductors, other than control power conductors when used, from the supply bus. See Figure 2.1.

MAIN SECTION(S) – A portion of a switchboard where the main or service disconnect device(s) is located. The section shall also be permitted to contain utility meters or other instruments. Incoming line conductors may be terminated in this section. See figure 2.1.

NEUTRAL – Neutral refers to a conductor (when one exists) of a polyphase circuit or single-phase, 3-wire circuit which is intended to have a voltage such that the voltage differences between it and each of the other conductors are approximately equal in magnitude and are equally spaced in phase, such as:

- a) the center point of a wire connected system,
- b) the midpoint of a 3-wire, single phase system,
- c) the midpoint of one side of a delta connected system.

RATING - A designated limit of operating characteristics based on definite conditions.

RATING PLUG – A self-contained portion of a circuit breaker that is interchangeable and replaceable in a circuit breaker trip unit by the user. It sets the Rated Current (In) of the circuit breaker.

SERVICE EQUIPMENT – The necessary equipment, usually consisting of a circuit breaker or switch and fuses, and their accessories, located near the point of entrance of supply conductors to a building or other structure, or an otherwise defined area, and intended to constitute the main control and means of cutoff of the supply.

SHORT-CIRCUIT CURRENT RATING – The maximum RMS available current to which a device can be connected. The rating is expressed in amperes and volts.

SWITCH - A device, manually operated, unless otherwise designated, for opening and closing or for changing the connection of a circuit.

SWITCHBOARD — A large single panel, structural frame or assembly of panels or structural frames on which may be mounted, on the face or back or both: switches, overcurrent, and other protective devices, buses, and instruments.

Note: Switchboards may be accessible from the rear as well as from the front and are not intended to be installed in cabinets.

SWITCHBOARD ENCLOSURE — An enclosure that encloses one or more switchboard sections or switchboard interiors, or provides auxiliary wiring space for an adjacent switchboard section.

SWITCHBOARD INTERIOR — The interior part of a switchboard intended to be installed in a switchboard enclosure to become the equivalent of a switchboard section.

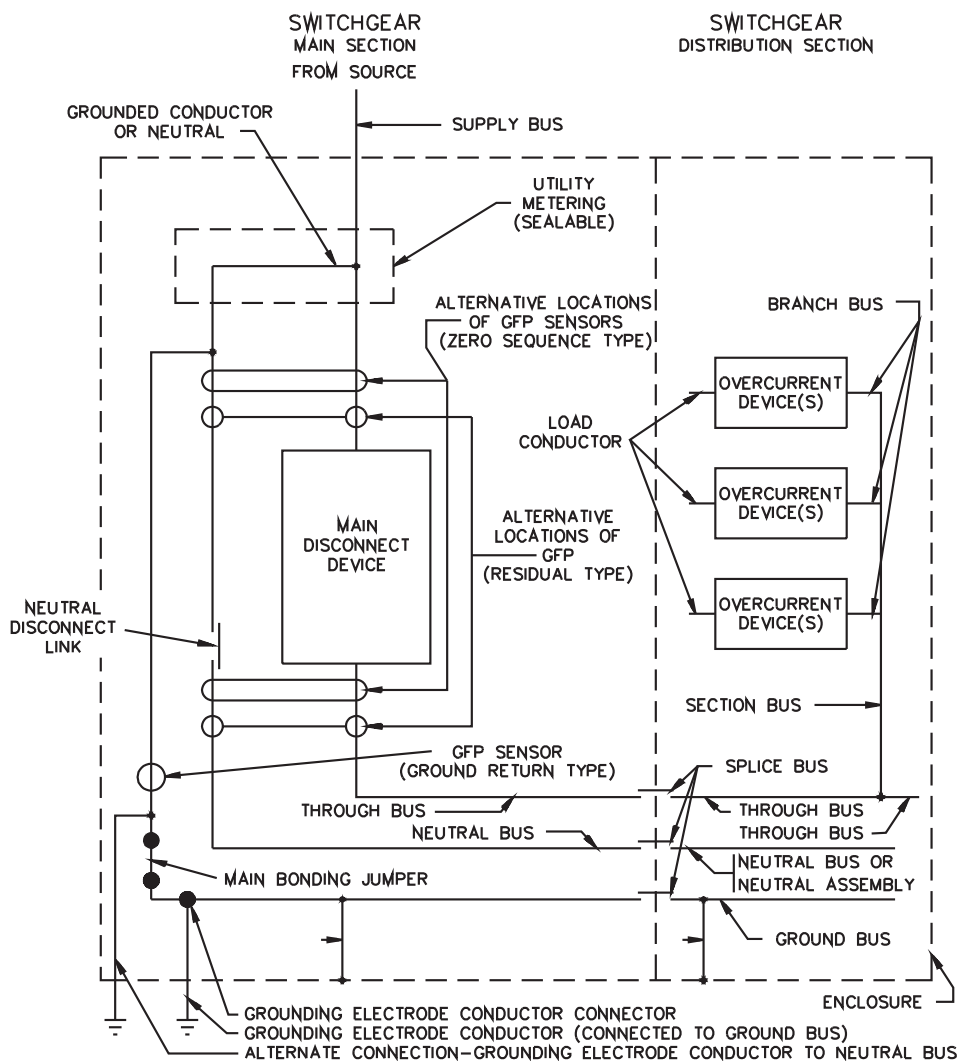
SWITCHBOARD SECTION — That portion of a switchboard that is prevented by the structural framework from being physically separated into smaller units.

Note: Framework that is welded or joined with steel rivets over 1/4 inch (6.4 mm) in diameter is considered to constitute a single section. However, framework that is joined with one-way (tamper-proof) bolts is not considered to constitute a single section. An assembly consisting of an enclosure and terminal blocks or bus bars is considered to be a switchboard section.

SYMMETRICAL CURRENT - Alternating current having no offset or transient component and, therefore, having a wave form essentially symmetrical about the zero axis. Symmetrical current is expressed in terms of rms A.

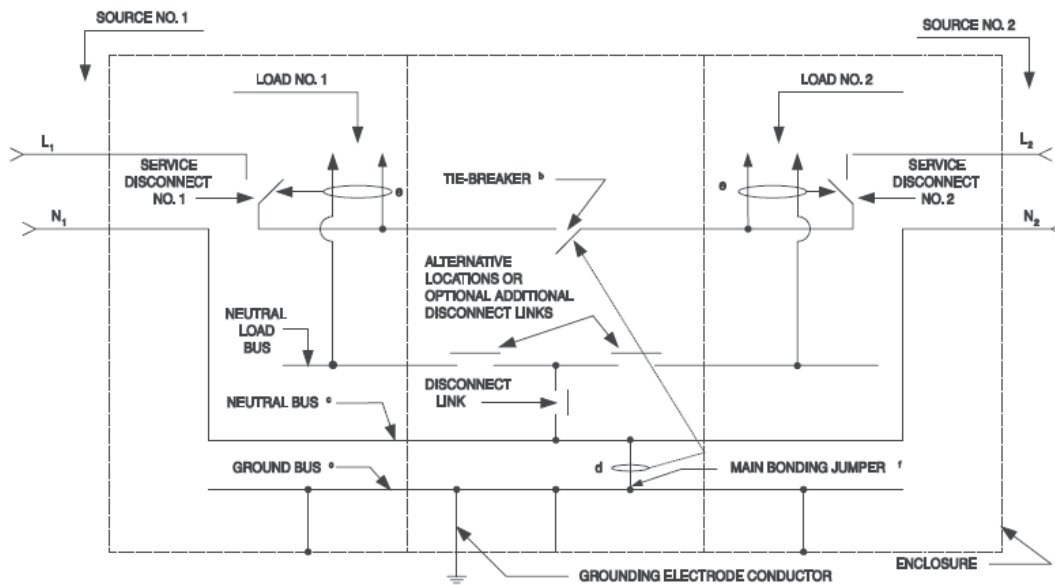
TAP – A terminal or provision for a terminal intended for field wiring that is located on the supply side of the service disconnecting means, for uses permitted by the installation rules of the country of installation.

FIGURE 2.1
TYPICAL DEAD-FRONT SWITCHBOARD LAYOUT



SC1177-3

FIGURE 2.2
TYPICAL DOUBLE-ENDED SWITCHBOARD^a



^a Other variations are possible.

^b Tie-breaker disconnect (not a circuit breaker marked “Line” and “Load,” nor a fused switch).

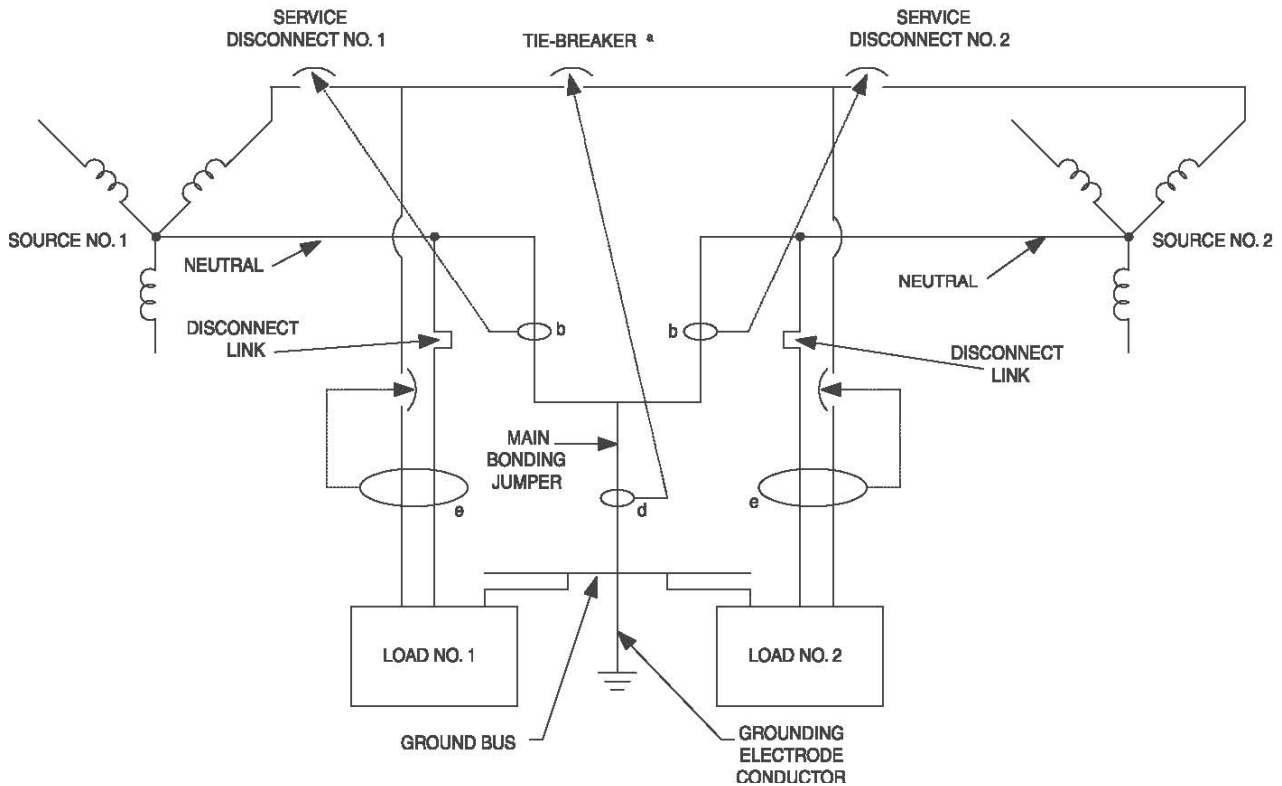
^c The neutral bus and ground bus may be combined if ground-return type ground-fault protection is not used and the sections are marked “Suitable only for use as service equipment.”

^d Ground-return type ground-fault protection sensor.

^e Zero sequence or residual type ground-fault protection sensor.

^f Size of main binding jumper based on largest service disconnect.

FIGURE 2.3
TYPICAL DOUBLE-ENDED SWITCHBOARD



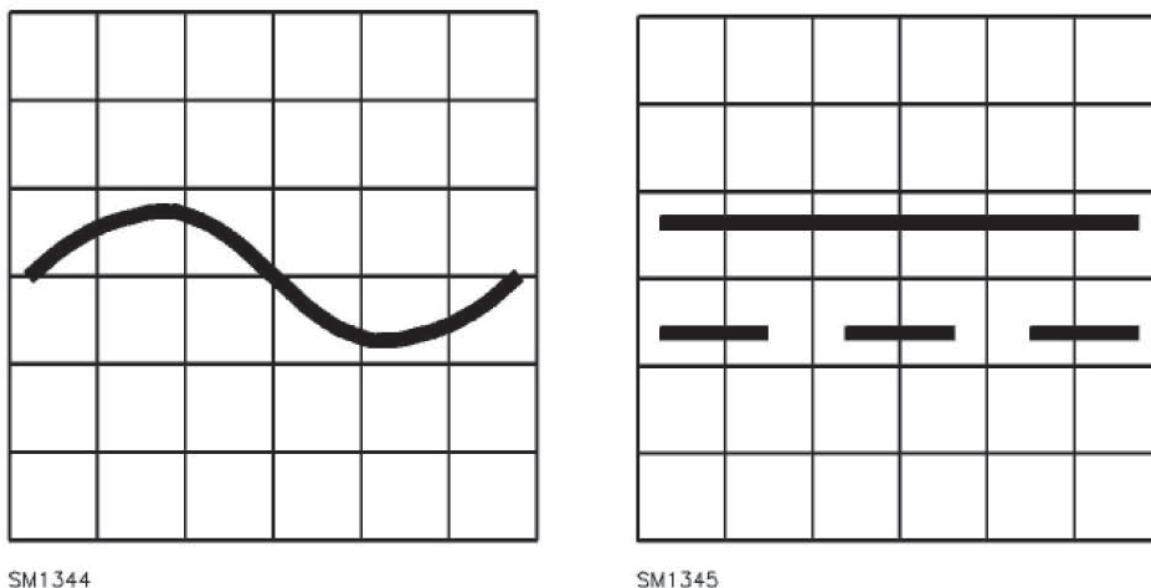
- ^a Tie-breaker disconnect (not a circuit breaker marked “Line” and “Load,” nor a fused switch).
- ^b Additional ground-return type ground-fault protection sensors are utility interlocked with the sensor described in note d so as to function only when a fault current is also sensed by the sensor described in note d.
- ^c Size of main bonding jumper based on largest service disconnect.
- ^d Ground-return type ground-fault protection sensor.
- ^e Zero sequence or residual type ground-fault protection sensor.

3. ELECTRICAL RATINGS

General

The electrical rating includes voltage, current, frequency and short-circuit current ratings. An alternating current rating includes the number of phases, if other than single phase. Voltage ratings are followed by the symbol for alternating current and/or the symbol for direct current. See figure 3.1.

FIGURE 3.1
AC AND DC VOLTAGE SYMBOLS



A switchboard section or interior with provisions for connection to two or more supply sources is marked to indicate the current and voltage ratings for each supply source.

A switchboard section or interior with provision for connection to an external source of control circuit power, are marked to identify that purpose. The current and voltage ratings for the power source are marked or indicated on a wiring diagram.

Location

A switchboard section is marked with the electrical rating where it will be visible without removing any cover or trim.

A switchboard interior is marked with the electrical rating where it will be visible before or after a cover is installed.

A switchboard enclosure that is marked for use with a particular switchboard interior is marked with the electrical ratings of the switchboard interior, unless the switchboard interior rating will be visible, after installation, without removing any cover.

Voltage Rating

A switchboard section or interior is rated no more than 600 volts.

A switchboard section or interior may be marked with several alternative voltage ratings.

A switchboard section or interior that is designed for use on supply circuits involving two different voltages is marked with a combination voltage rating, e.g., 208Y/120, 480Y/277.

If a switchboard section or interior contains a transformer with a secondary circuit that leaves the section or interior, the transformer secondary voltage rating is marked.

Current Rating

Each switchboard section or interior is marked with the current rating of the supply bus and section bus; and, in addition, with the rating of the through or splice bus supplying the next section or interior, if the through or splice bus current rating is less than the current rating of the supply bus.

The adequacy of the supply, through, splice or section bus current rating with respect to the calculated load current (using the appropriate diversity factors in Article 220 of the *NEC*[®]) can only be determined at the time of final installation.

If the ampacities of the various phase bus bars, including the neutral bus bar, are not identical, the current rating markings of each bus bar and terminal are provided.

Short-Circuit Current Rating

Each switchboard section containing devices other than a transformer and associated wiring or interior is marked with the following information:

A. The words “Short-Circuit Current Rating” and the dc or rms symmetrical short-circuit current rating in amperes as noted in Table 3.1. If the switchboard section or interior contains meter mounting equipment other than that intended for use with current transformers, the phrase “Watt-hour meter not included in the short-circuit current rating” is also provided.

B. The maximum dc or rms voltage rating for each short-circuit current. (Since the ability of an overcurrent protection device to open on fault currents is affected by the voltage rating of the circuit, a switchboard may have several different short-circuit current ratings, each associated with a specific voltage rating.)

C. A statement that the short-circuit ratings are limited to the lowest short-circuit rating of (1) any switchboard section connected in series, (2) any installed circuit breaker or fused switch other than those located in a control circuit, (3) the short-circuit rating marked on the switchboard of any installed combination series-connected circuit breaker, or (4) any installed panelboard having a marked short-circuit rating.

D. A statement that additional or replacement devices –other than fuses – are to be of the same manufacturer, type designation, and equal or greater interrupting rating. This

may be accomplished by specific reference to the device if the interrupting rating of the device is not less than any marked short-circuit current rating of the switchboard. The ampere rating of the device is also included if the short-circuit rating varies with the ampere rating of the device. For a fuse, the class of fuses shall be specified.

E. If applicable, identification of the combination of the integral or remote main and branch circuit overcurrent devices that are required when applying the marked short-circuit current rating.

TABLE 3.1 RMS SYMMETRICAL OR DC SHORT-CIRCUIT CURRENT RATING

Amperes		
5,000	25,000	75,000
7,500	30,000	85,000
10,000	35,000	100,000
14,000	42,000	125,000
18,000	50,000	150,000
22,000	65,000	200,000

Figure 3.2 shows an example of a switchboard marking providing information for installation of circuit breakers having a lower interrupting rating than the short-circuit current rating of the switchboard. Circuit breakers are acceptable for use above their marked interrupting rating if used on the load side of a specific overcurrent device. (Blank spaces would be filled with appropriate information.)

FIGURE 3.2 SAMPLE SHORT-CIRCUIT CURRENT RATING

- A. “The short-circuit current rating of this switchboard is equal to the lowest interrupting rating of any installed circuit breaker or fused switch, but not more than _____ rms symmetrical amperes at _____ volts, 3-phase, or _____ rms symmetrical amperes at _____ volts, single phase”; and
- B. “The interrupting rating of a circuit breaker is 5,000 rms symmetrical amperes and for a fused switch is 10,000 rms symmetrical amperes”, or as marked on the device, except for the following series combination ratings:

Load Side				Line Side			Interrupting Rating		
Circuit Breakers				Circuit Breakers					
Mfr.	Type	Poles	Amp Rating	Mfg.	Type	Amp Rating	Symmet	Volts	Phases
							Amp rms	ac	

A load side circuit breaker may be a branch, sub-main, or an integral main used on the load side of a remote main. A line side circuit breaker or fused switch may be a sub-main, integral main, or a remote main. This series combination short-circuit current rating shall not exceed the interrupting rating of the line side circuit breaker or fused switch.

If the short-circuit current rating of a switchboard is dependent upon the use of a specific overcurrent device ahead of the switchboard, the switchboard is marked “When protected by _____ ampere maximum Class _____ fuse or _____ Type circuit breaker rated no more than _____ amperes, this switchboard is suitable for use on a circuit capable of delivering no more than _____ rms symmetrical amperes volts maximum.” The second blank space is filled with the fuse type designation (CC, G, J, L, RK1, RK5 or T). The third blank space is filled with the name of the circuit breaker manufacturer and the type designation.

The marking indicates only the type of overcurrent device(s) with which the switchboard has been tested.

4. PHASE IDENTIFICATION

Unless marked otherwise, the phase arrangement of the supply, through and section bus bars in a 3-phase switchboard, but not including the connections to meter sockets, is A, B, C from front to back, top to bottom, or left to right as viewed from the front of the switchboard section or interior.

5. SERVICE EQUIPMENT

Switchboards suitable for use as service equipment are provided with one of the following markings:

- A. “Suitable for use as service equipment” or
- B. “Suitable for use only as service equipment.”

Additional wording that places limitations on the use of the switchboard when used as service equipment may be added to either of the markings above for specific constructions. Typical wording that may be added is “... when no more than six main disconnecting means are provided.”

Unless otherwise indicated below, a switchboard that is marked for use as service equipment will contain from one to six service disconnecting means, service overcurrent protection, a neutral disconnecting link, a main bonding jumper and a grounding electrode conductor terminal.

The section or sections of a multi-section switchboard that contain the main bonding jumper, the grounding electrode conductor terminals and the neutral disconnecting means will be marked.

The main bonding jumper, the grounding electrode conductor terminal and the neutral disconnect link are identified by a marking or tag located on or adjacent to the part.

A switchboard marked per A or B above may also be used to provide the main control and means of cutoff for a separately derived system or a separate building.

Some ac rated switchboards incorporate neutrals that are factory bonded to the enclosure. Such switchboards are marked "Suitable only for use as service equipment."

If a switchboard section contains a service disconnect that serves as a main for a group of sections, the service overcurrent protection need not be provided if the section is marked "Suitable for use as service equipment for a second building if located on the load side of overcurrent protection not exceeding the switchboard supply current."

If a switchboard section or interior is marked "Suitable for use as service equipment" or "Suitable for use as service equipment when no more than six main disconnecting means are provided," the marking "Service disconnect" is provided in the form of pressure sensitive labels in an envelope or on a card with instructions to apply the labels near the disconnect handles if the equipment is used as service equipment. However, if the switchboard is intended for a particular installation in which it is known that it will be used as service equipment, the markings may be applied at the manufacturing location.

6. GROUND-FAULT PROTECTION

General

Switchboards provided with ground-fault protection are marked to indicate the circuit-main, feeder or branch-circuit that is so protected. If a marking on the ground-fault sensing or relaying equipment is not visible from the front of the switchboard with the cover removed, a separate marking, such as on the wiring diagram, is provided.

In a switchboard section or interior with ground-fault protection, the part of the neutral bus used for load terminations is marked with the following or equivalent statement: "Do not connect grounding conductors to these or any other neutral terminals; to do so will defeat ground-fault protection." This marking is placed on or adjacent to the neutral.

If components of a ground-fault protection system are located in two adjacent sections, a complete wiring diagram of both sections is secured to each of the sections.

If the control circuit for ground-fault protection is intended to be connected to an external source, the marking "External source connection for control circuit of ground-fault sensing and relaying equipment volts (ac or dc)" or equivalent is provided. If terminals for an external source for other types of control circuits are provided, they are similarly marked.

A switchboard section or interior (1) intended only for use as service equipment or (2) acceptable for use as service equipment and not provided with ground-fault protection is marked for a

specific use as follows:

- A. For a section or interior rated 3-phase and 4-wire: “Suitable only for use as service equipment when supplying a continuous industrial process” or “Suitable for use as service equipment only if supplying a continuous industrial process.”
- B. For a section or interior rated 3-phase and 3-wire, one of the markings specified in item A above plus the words “... or for systems where the neutral is not solidly grounded.”
- C. For supplying a fire pump or for an alternate source for legally required standby service. The above limitations noted in the preceding paragraph are based on *NEC*® Section 230.95, Exception, and Section 695.6(G).

Field Testing Information Sheets and Forms

To provide for system performance testing as required in the *NEC*® Section 230.95(C), each ground-fault relay and each apparatus incorporating a ground-fault relay or its functions that is intended for protection of a solidly grounded wye service rated more than 150 volts to ground but not exceeding 600 volts phase-to-phase is provided (1) with a test form and (2) with information sheets describing system testing instructions.

The test form includes spaces for the date the test was conducted and for the test results, and states that the form should be retained by those in charge of the building’s electrical installation in order to be available to the authority having jurisdiction.

The information sheet instructions include the following items and basically prescribe only that information necessary to perform the tests. The instructions are separate from more elaborate test details that the manufacturer may wish to provide. The instructions specify that:

- A. The interconnected system shall be investigated in accordance with the switchboard manufacturer’s detailed instructions, and that this investigation is to be undertaken by qualified personnel.
- B. The location of the sensors around the bus of the circuit to be protected shall be determined. This can be done visually, with knowledge of which bus is involved.
- C. The grounding points of the system shall be verified to determine that ground paths do not exist that would bypass the sensors. The use of high-voltage testers and resistance bridges may be suggested.
- D. The installed system is to be tested for correct response by the application of full-scale current into the equipment to duplicate a ground-fault condition, or by equivalent means such as by a simulated fault current generated by (1) a coil around the sensors or (2) a separate test winding in the sensors.
- E. The results of the test are to be recorded on the test form provided with the instructions.

7. TAPS

A tap, circuit, section or switchboard cannot be marked for emergency use. However, an automatic transfer switch may be marked for connection to an emergency source.

Some switchboards may have terminals or provisions for terminals, marked as taps, located on the supply side of the service disconnecting means. The suitability of these terminals as taps connected on the supply side of the service disconnect is intended to be determined in accordance with *NEC*® Sections 230.46, 230.82, 701.12(E) and 705.12.

Deadfront switchboards are not Listed to have their busbars tapped in the field unless there are existing holes in the busbars marked with the word “Tap” adjacent to the holes in the factory. Other holes in the busbar that are not marked with the word “Tap” are intended for the connection of overcurrent devices, other device’s as identified by the product markings and in the installation instructions, or other uses identified by the manufacturer. When the electrical equipment Listing does not include product markings or instructions for tapping busbars, this situation should be treated like any other field modification of Listed equipment.

Some Listed power equipment may have installation instructions with specific directions on tapping the busbars. If this is the case, this equipment can be field modified, following those manufacturer’s instructions, in accordance with the National Electrical Code® (NEC) Section 110.3(B). The UL White Book identifies the required markings for field-installed equipment that have been evaluated by UL. For additional information, please see the guide information for Dead-Front Switchboards (WEVZ).

Drilling or enlarging holes in busbars can increase the current density and reduce current carrying capacity. Some equipment is constructed with fully rated busbars, which have a typical current density of 1000 A per square inch of cross sectional area for copper and 750 A per square inch of cross sectional area for aluminum. However, some equipment use busbars at a higher current density and have temperature testing conducted to determine compliance with UL’s requirements.

Removing busbar material can result in higher operating temperatures, and additional holes can potentially weaken the busbar, which adversely affects the short circuit rating of the equipment required by NEC Section 110.10. Both sufficient wiring space and wire bending space need to be provided for the conductors and the wire connector at the tap connection. In measuring the wiring space, AHJs need to consider the possibility of the connectors rotating, which may result in reduction of the spacing between uninsulated live parts of opposite polarity and uninsulated live parts and ground.

Wire connectors (lugs) need to be Listed for the purpose and have the proper ratings for specific application, and the mounting hardware for wire connectors needs to be properly selected and attached with the correct torque. The potential reduction of required spacings from the wire connectors or fasteners to the enclosure or other busbars also needs to be evaluated. In completing the modification, all foreign material such as cutting oil, burrs and metal shavings needs to be removed from the equipment enclosure. Temporarily removed materials such as insulating barriers need to be returned to their original positions and secured. The above are just a few of the concerns and items that must be inspected, checked and reviewed where such modifications are made to this type equipment.

8. TERMINALS

Switchboard sections and interiors are for use only with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such a marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

A switchboard requiring access to field wiring terminals from the rear is marked on the front “Rear access required to make field connections.” The marking may be omitted if this statement is included in the conduit location instructions.

A wire terminal intended to secure more than one conductor in an opening is marked to indicate the number of conductors the terminal can accommodate. The marking is on the wire connector if visible, or in another visible location such as next to the terminal or on a wiring diagram.

If a pressure terminal connector provided in the switchboard section or interior for a field installed conductor requires the use of a special tool for securing the conductor, any necessary instructions for using the tool are provided. The instructions are located where readily visible, such as on the connector, on a wiring diagram, on a tag secured to the connector, or packaged with the terminal assembly kit.

If pressure terminal connectors are not provided on the equipment as shipped, the equipment is marked stating which pressure terminal connector or component terminal assemblies are for use with the equipment.

The terminal assembly packages have an identifying marking, wire size, and manufacturer’s name, trademark or other descriptive marking by which the organization responsible for the product may be identified. The marking also includes the required tightening torque unless the value of tightening torque is included along with the switchboard markings.

Tightening Torque

A switchboard section or interior is marked to indicate the specific tightening torque in pound inches or pound-feet for each pressure wire connector (except those requiring a special crimping tool) in the switchboard that is intended for field wiring. If different connectors are used for line, load, neutral or ground, the specific torques that are to be applied to each connector are clearly indicated. A calibrated torque wrench should be used to torque the wire connector to the specified value. Under-torquing or over-torquing may produce overheating and/or cause damage to the conductor. The torque marking may be provided in a written format or pictorially. See Table 8.1 for an example of a tightening torque marking.

The value of tightening torque for a field wiring terminal provided on a component such as a circuit breaker, switch or the like need not be marked on the switchboard section or interior.

A switchboard is marked in a location readily visible prior to being wired to indicate the required temperature rating of each field-installed conductor. This marking takes precedence over any device or component marking.

TABLE 8.1 EXAMPLE OF TIGHTENING TORQUE MARKING TIGHTENING TORQUE FOR WIRE CONNECTORS

Main Terminals		275 pound-inches (31.1 N • m)
Neutral Terminals	Main	275 pound-inches
	Large Branch	Torque screw to applicable value shown in Column B of the table for the conductor size installed.
	Small Branch	Torque screw to applicable value shown in Column A of the table for the conductor size installed.
Equipment Grounding Terminals	Large Hole	For three No. 10 AWG solid copper conductors, torque screw to 45 pound inches (5.1 N•m). For all other wire combinations, torque screw to value shown in Column B of the table for the conductor size installed.
	Small Hole	Torque screw to applicable value shown in Column A of the table for the conductor size installed.
Field-Installed Devices		Torque screw to value indicated on (or with) the device.

TIGHTENING TORQUE TABLE

Wire Size Installed in Connector		Tightening Torque			
		A		B	
AWG	(mm) ²	lb./in.	(N • m)	lb./in.	(N • m)
18–10	0.82–5.3	20	2.3	35	4.0
8	8.4	25	2.8	40	4.5
6–4	18.3–21.2	35	4.0	45	5.1
3	26.7	35	4.0	50	5.7
2	33.6	40	4.5	50	5.7
1–2/0	42.4–67.4	—	—	50	5.7

Conductor Temperature Ratings

A switchboard rated 110 amperes or less, or having any circuits for field wiring rated 110 amperes or less, is marked to indicate use of conductors sized for 60°C (140°F) ampacity for circuits rated 110 amperes or less, and conductors sized for 75°C (167°F) ampacity for circuits rated more than 110 amperes as specified in Table 310.15(B)(16) of the *National Electrical Code*®. The marking may specify conductors sized for 75°C ampacity for circuits rated 110 amperes or less if any circuit breaker involved is marked 75°C or 60/75°C.

If the circuit breaker is to be installed in the field, the switchboard marking indicates that the circuit breaker is to be marked either 60/75°C (140/167°F) or 75°C (167°F) if conductors sized for 75°C ampacity are to be used.

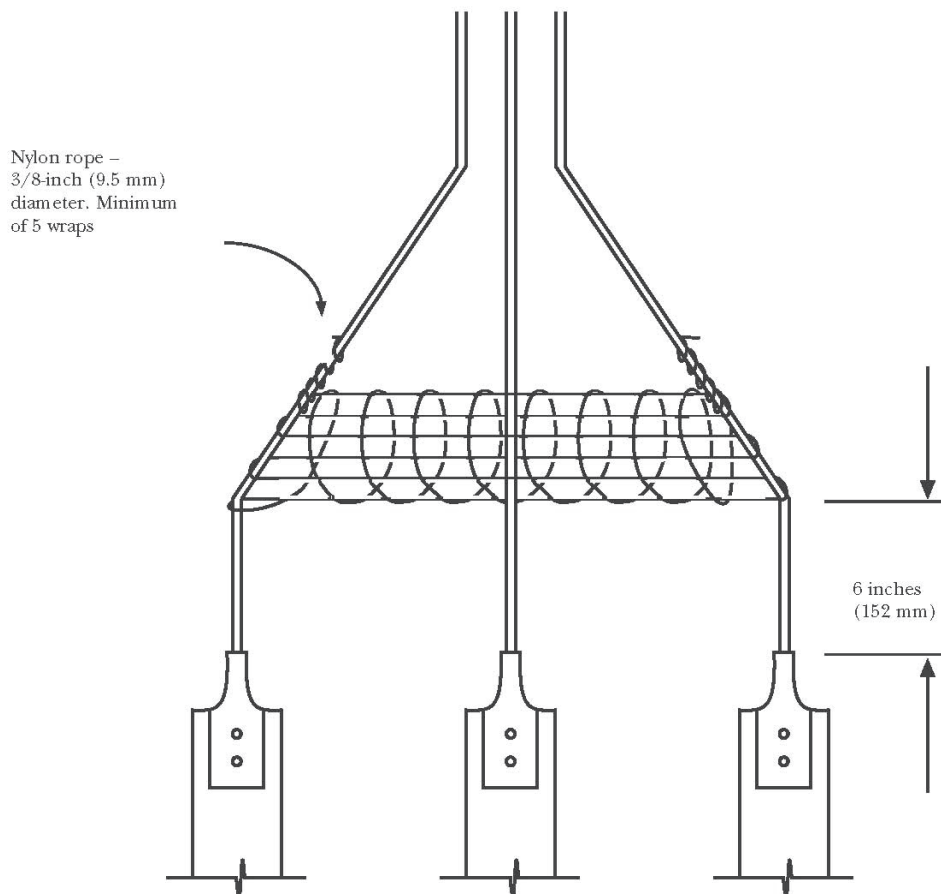
A marking is provided near a terminal, such as “Use AWG 90°C (194°F) copper wire,” to indicate that 90°C (194°F) copper wire is to be used. UL determines the size of the conductor on the basis of 75°C (167°F) ampacity.

9. BRACING

If bracing is required to prevent the conductors from pulling out of the wire terminals under fault conditions, a marking is provided indicating the type of bracing to be added to conductors routed through the switchboard between the point of entry or exit and the terminals. The marking is located adjacent to the terminals.

An example of a marking that satisfies this requirement is: “Wrap line cables together with minimal 3/8-inch nylon rope or rope having a minimum tensile strength of 2,000 pounds at (1) 6 inches and 12 inches from the line terminals with five wraps and (2) every additional 6 inches with five wraps or every 1 inch with one wrap.” The drawing in Figure 9.1 may also be provided.

FIGURE 9.1
SECUREMENT OF CABLE



10. SYSTEM COORDINATION

NEC® Section 240.12 concerns electrical system coordination. UL does not evaluate switchboards to determine compliance with the *NEC*® Section 240.12, since it is not possible to determine upstream and downstream system overcurrent devices that have been selected. It is the responsibility of the system design engineer to specify overcurrent devices for system

coordination.

11. VOLTAGE DROP

NEC® Sections 210.19(A)(1) and 215.2(A)(3) concern voltage drop. UL does not evaluate switchboards to determine compliance with voltage drop considerations. It is the responsibility of the design engineer to address any voltage drop considerations in a switchboard system, as needed.

12. CONDUIT ENTRY

Unless indicated otherwise (as noted below), UL evaluates switchboards to determine compliance for the clearance of conductors and conduit entering into the bottom of a switchboard, per *NEC*® Section 408.5. Acceptability of other conduit entry/exit points can only be determined at the time of final installation.

In order to correlate with *NEC*® Section 408.5, if the minimum distance between the bottom of the enclosure and any bus bars is less than:

- A. 8 inches for insulated bus bars, their supports and other obstructions, or
- B. 10 inches for uninsulated bus bars,

then instructions and drawings showing the intended conduit or raceway locations are (1) supplied with the switchboard section or enclosure or (2) contained in the manufacturer's catalog (identified by the catalog number or other designation that appears on the switchboard).

13. ENCLOSURE TYPES

A switchboard section or enclosure is provided with a marking that is visible after installation that indicates the enclosure type designation(s). This marking helps inspection authorities to judge whether an enclosure is suitable for a specific environment as mentioned in *NEC* Section 110.3(A)(1). Enclosure type designations are coordinated with requirements in *NEC* Section 110.28.

14. MULTIPLE SOURCES

A switchboard intended to be connected to multiple sources shall be marked to indicate that both ends of a disconnecting means may be energized. The marking shall be provided on all covers that give access to the disconnecting means.

15. BARRIERS

In a switchboard section or interior marked as being suitable for uses as service equipment, any uninsulated ungrounded bus bar or terminal on the line side of a service disconnect is isolated by a barrier so that with every service disconnect in the off position, no uninsulated live part is exposed to inadvertent contact while servicing any load terminal, including a neutral load terminal, a branch circuit equipment grounding terminal or the neutral disconnect link. The barrier may contain ventilating openings.

16. FIELD INSTALLATION OF DEVICES

The UL Mark applies to the switchboard as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer's declaration that the switchboard was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the switchboard or the continued validity of the UL certification mark unless the field modification(s) have been specifically investigated by UL. Unless UL investigates a modified switchboard, UL cannot indicate that the switchboard continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the switchboard has specific markings regarding field-installation of equipment. A switchboard enclosure or section intended to accommodate a field installed device is marked to indicate the manufacturer and the catalog number or equivalent of the device to be installed.

Additions to switchboards not marked for the field installation of such devices can be investigated under UL's Field Evaluation Service or Field Inspection Service.



Marking and Application Guide

ELECTRICAL HEATING AND COOLING EQUIPMENT

JANUARY 2013

Electrical Heating and Cooling
Equipment Marking and Application Guide

PREFACE

Because of changes in installation codes, the increasing complexity of the equipment involved, and other factors, more and more markings are being used on electrical heating and cooling equipment.

The markings described in UL 1995, the “*Standard of Safety for Heating and Cooling Equipment*”, and UL 1996, the “*Standard of Safety for Electric Duct Heaters*”, are required on the various types of electrical heating and cooling equipment for proper and safe installations. Markings that apply only to servicing and operating the equipment, or markings placed on the equipment by the manufacturer that are not required by UL, are not covered in the Guide.

The adequacy of the markings described is determined as part of the investigation of equipment bearing the UL Listing Mark.

UL has developed this guide for use by code and inspection authorities, contractors, installers, users, designers and other interested parties to aid in determining what markings are pertinent for safe and proper installation of electrical heating and cooling equipment, and to understand the significance of these markings in order to facilitate a reasonably safe and code-compliant installation.

UL Marking Guides are updated as necessary due to new product development, changes in the National Electrical Code®, or the need for clarification. To confirm the current status of any UL Marking Guide, please consult the Code Authorities page of the UL Web Site at www.ul.com/codeauthorities.



The Table of Contents lists the main headings and their page numbers. The Index gives an alphabetical list of the specific items and the section(s) number where information can be found. All references to the National Electrical Code® have been updated to the 2011 edition.

Your comments or suggestions are welcome and appreciated. They should be sent to:

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INTRODUCTION

USE OF THIS GUIDE

This guide is intended to assist regulatory authorities, designers, and installers in determining the suitability of electric heating and cooling equipment in a particular installation and use, and to address concerns related to fire, shock, and mechanical hazards.

Products are Listed or Classified by UL under an appropriate product category. A four-letter code (shown in parenthesis) following every category title in this guide is the UL product category code designation. A list of heating and cooling equipment product categories evaluated by UL, along with the applicable standard(s), can be found in Appendix A.

Each UL product category code provides a direct link to the Guide Information for the product category. The Guide Information includes the scope of the products covered, information relating to limitations or special conditions applying to the product, the requirements used for the investigation of the products, installation and use information, and information on product markings and the UL Mark to be used on the product.

The product markings identified in this guide do not include every possible marking that could be provided either on a product or in its installation or operation instructions. The purpose of these markings is to provide you with an indication of the type of text and location of markings that address features that may be critical in determining if a product is certified and / or if it is installed correctly. Refer to the specific Guide Information for the product category for additional marking information.

The numbering for code sections used in this document may change as the specific code is updated. A list of model codes and standards applicable for each product can be found in Appendix B.

Additional information can be found at www.ul.com.

INFORMATION ON LISTING VERSUS CLASSIFICATION

Most codes and regulations require the certification of heating and cooling equipment to applicable safety-related standards. They also may require this equipment to be certified to energy performance standards as well. Products that are certified to safety-related standards have been evaluated with regard to all reasonably foreseeable safety-related hazards, including fire, electrical shock and mechanical hazards. Such products are termed “UL Certified” or “UL Listed.” Products that are certified to a limited range of hazards, or for use under specific conditions are termed “UL Classified.”

It is important to distinguish the difference between “UL Certified” or “UL Listed” and “UL Classified” and the relation these terms have with the term “listed,” as used in various codes. The term “listed” in the codes generally indicates that the product is required to be evaluated in accordance with the appropriate standard(s) by an independent third party certification organization such as UL. The term “listed” in the codes should not be confused with the term “UL Listed,” as explained above. It is important to recognize that not all certification agencies make this distinction in their certification services.

INFORMATION ON UL MARKS

There are several types of UL Marks that can be found on heating and cooling equipment. General information on each of these Marks is provided below. Each has its own specific meaning and significance. The only way to determine if a product has been certified by UL is to look for the UL Mark on the product itself.

The UL Mark on a product means that UL has tested and evaluated representative samples of that product and determined that they meet the requirements in the applicable standard(s). Under a variety of UL programs, certified products are periodically checked by UL at the manufacturing facility to determine that they continue to comply with the standard(s).

The UL Marks may only be used on, or in connection with products certified by UL, and under the terms of a written agreement between the manufacturer and UL.

UL Listing Mark

This is one of the most common UL Marks. If a product carries this Mark, it means UL found that representative samples of this product met UL's *safety* requirements. These requirements are primarily based on UL's own published Standards for Safety, or other recognized third party standards. The UL Listed Mark includes the UL symbol, the word "Listed," the product or category name, and a control number assigned by UL.



UL Classification Mark

This Mark appears on representative samples of products that UL has evaluated but only with respect to specific properties, a limited range of hazards, or suitability for use under limited or special conditions. The UL Classified Mark includes the UL symbol, the word "Classified," a statement of the scope of evaluation, the product or category name, and a control number assigned by UL.



UL Gas-Fired Mark

UL's Gas-Fired Mark is used exclusively on gas-fired appliances and equipment. The Gas-Fired Mark indicates a product's compliance to nationally recognized gas standards, including UL, ANSI Z21/Z83 Series and CSA/CGA standards. The UL Gas-Fired Mark signifies that a product has been evaluated to reasonably foreseeable hazards including both gas and electrical hazards. Gas-fired equipment evaluated to Canadian national standards is authorized to display the Canadian Gas-Fired Mark. For gas-fired equipment evaluated to both U.S. and Canadian standards, the combination U.S. and Canadian Gas-Fired Mark is authorized.

GAS-FIRED



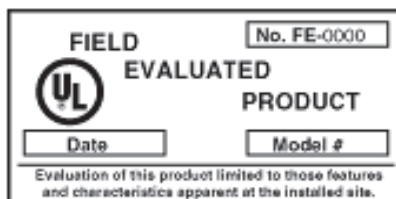
UL Energy Mark

The UL Energy Mark appears on air conditioners and furnaces, and similar products evaluated to U.S. and Canadian energy efficiency standards. These products are already certified for safety by UL before earning the UL Energy Mark.



FIELD EVALUATIONS

You may encounter situations in which you are unable to determine if a product has been listed by a third-party organization. Or in other situations you might encounter a product bearing a listing label that may have been modified in the field, and now you question whether or not the product still complies with the applicable standard. UL offers a field evaluation service that provides data to assist you in making your decision whether to accept the product and/or approve the installation. Anyone directly involved with a product – including manufacturers, owners, contractors, and regulatory authorities – can request a Field Evaluation. Detailed information for this program can be found on UL's Web site at www.ul.com/field.



1. GENERAL INFORMATION

UL Standards for electrical heating and cooling equipment include requirements for the location, legibility and permanence of the markings described in this Guide. These requirements vary depending on the importance of the marking, environmental and use conditions, and a number of other factors. UL evaluates the reliability of an adhesive used to secure a marking. UL requires markings to be located where they will be visible after the equipment is installed; and affixed to a permanent unit part, or to a part that requires the use of a tool to remove and that must be in place for the unit to operate properly except for certain supplementary markings.

Normally, nameplate markings must be located where they can be read without using tools to partially disassemble the unit. Access to the nameplate of a unit designed for built-in installation may require removal of a panel or grill that gives access to the field wiring compartment.

2. LISTING MARKS

Section 110.3(A)(1) of the *National Electrical Code®(NEC®)* states that “suitability of equipment may be evidenced by listing or labeling.” Only units that bear a UL Listing Mark are UL Listed. For electrical heating and cooling equipment, the UL Mark that is required on the unit includes: the name and/or symbol of Underwriters Laboratories; the word “LISTED;” a UL control number; and the product or category name. Some Listed Heating and Cooling Equipment may contain a Listed Gas Heating Section. This will be identified on the unit by the UL *Gas-fired Listing* Mark that is provided either on the Listed heating and cooling equipment or on a Listed gas-fired heating section or portion of a Listed Unit.



3. COMPANY IDENTIFICATION

If there is a question on the design or construction of a unit, the identification of the organization responsible for the product is important. This is one of the basic markings required by *NEC®* Section 110.21.

UL requires that the responsible manufacturer or private labeler be identified on the unit nameplate by a company name, trade name or trademark. This company is also known as the “Listee” and is the name that appears in UL’s published Directories. UL provides an Index of Tradenames and Trademarks in the Online Certifications Directory at www.ul.com/database .

4. MODEL IDENTIFICATION

The nameplate of every unit bearing a UL Listing Mark is required to include a distinctive model identification. This may be a “Model No.,” “Type,” “Cat. No.,” “Part No.,” or similar identification,

and may consist of any combination of numbers and letters. The model designation is important when referencing the manufacturer's installation instructions or other published literature, and when contacting the manufacturer or UL with questions about the product. The model designation is also important for determining the acceptable use of "split-system" sections, or accessories (see "Split-Systems" and "Use of Accessories").

5. SPLIT-SYSTEMS

Many central cooling air conditioners and heat pumps are Listed as "split-systems." Such Listings are given to equipment for which two or more sections of the system have been evaluated together. Sections of systems are typically identified on the Listing Mark as "Section of Central Cooling Air Conditioner" or "Section of Heat Pump," but may be identified as another type of Listed product such as a "Fan Coil Unit" or an "Electrical Central Heating Furnace." These Listed combinations are identified in the UL *Electrical Appliance and Utilization Equipment Directory*. It is important to note that combinations of equipment not identified in UL's published Listings have not been evaluated by UL.

6. USE OF ACCESSORIES

UL evaluates accessories to determine their suitability for field installation and use with specific models of UL Listed equipment. Listed accessories bear a Listing Mark that includes the word "accessory" in the product or category name (see "Listing Marks"). The Listing Mark may indicate the specific equipment type with which the accessory is to be used (such as "Accessory for Heat Pump"). If the Listing Mark indicates "Air Conditioning Equipment Accessory," it is commonly designed for use on more than one type of heating or cooling equipment. In all cases, however, the accessory is Listed only for equipment marked (on wiring diagram, etc.) to indicate the permitted use of the specific accessory. Many Listed units are marked for use with more than one accessory. In some cases, the marking will indicate that if one accessory is used, another must be used in conjunction.

One common marking for accessories relates to the use of supplementary electric resistance heaters. Typically, such a marking will indicate the optional use of any one of a series of heater accessories. It will usually also specify some action to be taken by the installer to indicate which heater has been installed or that no heater has been installed. Failure of the installer to perform the specified action can be considered as noncompliance with *NEC*® Section 110.3(B). For example, the marking may state, "Any of the following heater accessories may be installed. Installer to check appropriate block" followed by a list of accessory model numbers and associated electrical ratings, including a line stating "none." To comply with *NEC*® Section 110.3(B), the installer must mark the appropriate block. The accuracy of this installer marking can be verified by examining the markings on the accessory.

For some accessory types, such as a compressor "hard start" kit, the intended mounting location within the unit may not be obvious. In such cases, the unit marking is required to indicate the intended mounting location.

A unit Listed for use with accessories requiring wiring connections to the unit will show these connections on an attached wiring diagram (see "Wiring Diagram").

7. EXTERNAL LOADS OR LINE VOLTAGE SWITCHING DEVICES

A unit that provides a means for connecting an external load, such as a cooling tower, an evaporator blower motor, or a blower motor that circulates air across duct heaters, is marked to specify the maximum rating of each such load. These markings may also specify the minimum wire sizes to be used. Minimum wire size markings are required when the load is a motor connected to a multimotor or combination load circuit and the wire size normally adequate for carrying the load current would not be protected properly by an overcurrent device for the circuit.

A unit with a means of connecting a switching device in other than a Class 2 control circuit is marked with the minimum required ratings for each such device.

These markings are located in the unit where field wiring is to be connected to the remote load or switching device, or on the wiring diagram attached to the unit (see “Wiring Diagram”).

8. SUPPLEMENTARY OVERCURRENT PROTECTION

NEC® Section 424.22(C) permits supplementary overcurrent protective devices required for subdivided loads of resistance type heating elements in electric space heating equipment to be supplied as a separate assembly by the heater manufacturer. All units that require this supplementary overcurrent protection, but do not have the protective devices factory installed, are marked to identify the separate assembly available from the unit manufacturer. This information is marked on or adjacent to the nameplate containing the electrical ratings of the heating elements. The assembly has a separate UL Listing, and the common identification on its Listing Mark is “Control Panel for Specific Electric Space Heating Equipment.”

Other specific Listed separate assemblies such as a panelboard, however, may be referenced by the marking on the heating unit. In any case, the proper use of the separate assembly identified on the unit will provide compliance with *NEC*® Sections 424.22(B) and (C).

9. ELECTRICAL RATING, GENERAL

The nameplate for each Listed unit includes the appropriate electrical ratings. These ratings identify the required characteristics of each electrical circuit to be connected to the unit and also the load characteristics that the unit will impose on each circuit.

For a unit with a single motor as its only energy consuming component, the motor nameplate may provide the required electrical ratings if all ratings on the motor nameplate apply to its use in the unit, and the motor nameplate is visible as installed. If motor ratings are shown on the unit nameplate, they take precedence over the ratings on the motor nameplate.

10. VOLTAGE RATING

All equipment requiring connection to an electrical supply source is required to include the voltage rating of each source on the unit nameplate. The rating includes the voltage as either a single nominal value such as “230 V” or as a voltage range such as “220—240V.” Standard voltage ranges are 110—120, 200—208, 220—240, 254—277, 440—480 and 550—600. Units marked with a single nominal value within one of these voltage ranges can be connected properly to any

voltage within the indicated range, but not to a different voltage. For example, a unit marked “230 volts” can be connected properly to a 240-volt supply source, but not to a 208-volt supply source.

Some equipment is marked for use on more than one voltage. Individual voltage ratings may be a single value or a range of values as indicated above, with each of the multiple ratings separated from the others by a slash (e.g., “208/240” or “220—240/440—480”) or by a separate line or column in a tabulation of ratings.

When inductive loads are involved, it is usually necessary to change some connections to make the equipment suitable for one of the voltage ratings. Instructions for these changes are usually indicated on the wiring diagram attached to the unit and typically involve at least a change in a control circuit transformer tap within the equipment.

If the inductive load is a motor, the instructions may appear on the motor itself, with a marking to indicate the voltage for which it is factory connected and how to reconnect it for another voltage.

Many motors and other components with dual voltage ratings, however, are used in equipment that is UL Listed for a single voltage only. When a unit is UL Listed for more than one voltage, this is indicated on the unit nameplate.

Some equipment showing two voltage ratings may be designated to have both voltages supplied from the same supply circuit. In such cases, the rating indicates the number of wires needed in the supply circuit (e.g., “120/240 V, 3W” or “120/240 V, 3ph, 4W”) or the number of wires will be indicated clearly on the wiring diagram attached to the unit.

Some equipment designed for connection to a 2-wire branch circuit nominally rated at 208 or 240 volts, may not be suitable for potentials exceeding 120 volts to ground. Such equipment is marked “Maximum Voltage to Ground 120” (or the equivalent) near the supply voltage rating.

11. FREQUENCY RATING

Some form of frequency rating is required with each marked voltage rating. This may be identified as “Cycles,” “Cycles per Second,” “Hertz” or an appropriate abbreviation. A unit or unit circuit for connection to direct current will be marked to indicate this suitability.

12. ELECTRICAL LOAD RATINGS

The unit nameplate indicates the electrical load on each supply circuit, other than a Class 2 control circuit, to which the unit is intended to be connected. These load ratings include any remote loads or accessories identified by markings on the unit (see “Remote Loads” and “Use of Accessories”). In general, the individual segments of this load rating are appropriately identified. Rather than individual ratings for each load segment, a single overall rating may be given:

- 1) When a unit does not include any motors rated at 1/8 horsepower or more; or
- 2) When a unit rated for single-phase alternating current includes a hermetic refrigerant motor-compressor and other loads, and its markings indicate a minimum circuit ampacity and maximum size of the overcurrent device of 15 amperes at 240 volts or less, or 20 amperes at 120 volts (see

“Minimum Circuit Ampacity” and “Branch-Circuit, Short-Circuit and Ground-Fault Protection”).

For some units intended to be connected to two or more supply circuits, it may be necessary to consult the unit wiring diagram to determine which loads are connected to each circuit (see “Wiring Diagram”).

The load rating may be expressed in watts or kilowatts for resistance loads such as electric heaters and motors rated less than 1/8 horsepower. All other load ratings are expressed in amperes.

For hermetic refrigerant motor-compressors, the required individual segment rating is always given in rated-load amperes (RLA). Locked-rotor amperes (LRA) are also included but may be omitted for single-phase compressors with an RLA rating of 9 amperes or less at 115 volts, or 4.5 amperes or less at 230 volts.

Air conditioning liquid chillers with “star-delta” start centrifugal motor-compressors and not factory equipped with a controller or overload protection for that motor are marked with LRA ratings for both the star and delta connections (see “Remote Overload Protection for Motors”).

For all other motors, the required individual segment rating is expressed in amperes, full-load amperes, or an appropriate abbreviation. A locked-rotor current rating is not required.

A pilot duty (electromagnetic) load, or a resistance load of less than 1 ampere need not be identified separately on the unit nameplate. Also, a load such as a crankcase heater need not be identified separately if it is not energized concurrently with an identified larger load, such as a compressor motor. The unit nameplate ratings for motor loads may differ from the ratings on the motor nameplates. Unit nameplate ratings should be used for properly sizing the supply conductors, disconnect means, etc., since these ratings reflect the actual loads that will be imposed by operation of the motor in the unit.

Units with dual voltage ratings may also show dual-load ratings or a single-load rating representing the highest load imposed at either voltage. Dual-load ratings can be shown in tabular form or separated by a slash. For example, a motor rating of “120/240 V, 6.4/ 3.2 A” indicates the motor is rated 6.4 amperes at 120 volts and 3.2 amperes at 240 volts.

13. MOTOR HORSEPOWER RATINGS

In equipment where the selection of a properly rated remote controller or disconnect means is dependent on the horsepower rating of a motor, the horsepower rating is required to be included in the unit nameplate (see “Electrical Rating, General”). It is not necessary that a horsepower rating be included on the unit nameplate for a hermetic refrigerant motor-compressor.

If the nameplate is marked with the disconnect size the horsepower is not required to be marked for the other motors.

A fan or blower motor rated at less than 1/8 horsepower when its ampere or wattage rating is included on the unit nameplate

14. BRANCH-CIRCUIT SELECTION CURRENT

The nameplate on a unit that includes a hermetic refrigerant motor-compressor may show branch-circuit selection current for the motor-compressor in accordance with *NEC*® Section 440.4(C). This rating may be identified by a suitable abbreviation and will always be equal to or higher than the motor-compressor RLA rating marked on the unit nameplate. The branch-circuit selection current rating for the motor-compressor is to be used instead of the rated-load amperes in determining appropriate ratings for externally mounted controllers and disconnecting means, branch-circuit conductors, and short-circuit and ground-fault protective devices for these conductors. A branch-circuit selection current rating is always included on the unit nameplate if the motor-compressor's thermal protector or the protective system built into the unit permits a continuous current flow greater than 156 percent of the rated-load current for the motor-compressor, or the single overall ampere rating for the unit marked on the unit nameplate (see "Electrical Load Ratings").

15. SUPPLY WIRE SIZE

According to *NEC*® Section 424.3(B), the ampacity of branch-circuit conductors supplying fixed electric space heating equipment consisting of resistance elements with or without a motor shall be not less than 125 percent of the total load connected to the circuit. Units incorporating fixed electric space heating means on the same circuit with a motor usually show the minimum required ampacity for the conductors supplying that circuit (see "Minimum Circuit Ampacity"). If a circuit supplying fixed electric space heater does not include a motor, the unit marking needs not to show a minimum circuit ampacity. The above noted *NEC*® requirement ordinarily applies to the proper sizing of the supply conductors for such a circuit.

NEC® Sections 424.22(D) and (E) indicate exceptions to the requirement for sizing such conductors based on 125 percent of the load. Units with fixed electric space heating loads arranged in accordance with these exceptions are marked with a minimum conductor size for each such circuit involved. Such markings are located on or adjacent to the unit nameplate. For other markings that specify minimum conductor size, see "Temperature Ratings of Field Installed Wiring" and "External Loads for High Voltage Switching Devices."

16. MINIMUM CIRCUIT AMPACITY

In general, a unit designed to have more than one motor, or a motor with other loads, supplied from a single branch-circuit, must be marked to show the minimum required supply-circuit conductor ampacity for each circuit. There are two exceptions:

- 1) If the branch-circuit involved is to be rated 15 amperes, and the unit is marked "Use Only on a 15 Ampere Branch-Circuit;" and
- 2) If the unit is to be supplied through a remote control assembly specified on the unit nameplate, and the minimum ampacities are specified on that assembly.

These ampacity markings are in accordance with *NEC*® Section 430.7(D) and 440.4(B) and are computed in accordance with Section 430.24 and 440.33. Any remote loads identified by other markings on the equipment and supplied from the unit are included in these computations. The

marking is on or adjacent to the unit nameplate and is usually identified as “Minimum Circuit Ampacity” or its abbreviation.

17. BRANCH-CIRCUIT, SHORT-CIRCUIT AND GROUND-FAULT PROTECTION

Units required to be marked with a minimum circuit ampacity (see “Minimum Circuit Ampacity”) are also required to show the maximum ampere rating of the short-circuit and ground-fault protective device for each applicable circuit. These markings also conform with *NEC*® Section 430.7(D). They are computed in accordance with Section 430.53 and take into account any remote loads used in the ampacity calculations. The branch-circuit, short-circuit and ground-fault protection marking is included on the same label as the ampacity marking and is typically identified as “Maximum Fuse Amps,” “Maximum Fuse or HACR Type Circuit Breaker Amps,” “Maximum Fuse or Circuit Breakers Amps,” “Maximum Overcurrent Protection Amps” or their suitable abbreviations.

There are several other situations when the maximum ampere rating of the short-circuit and ground-fault protective device must be marked on the unit, even though a marking for minimum circuit ampacity may not be required. Typical examples are overcurrent protection devices for separate high voltage control circuits or transformers in the unit. These markings are identified in the same manner as described above, but can be located on an attached wiring diagram (see “Wiring Diagram”) or adjacent to the terminals or leads to which the supply circuit wires are to be connected, rather than on or adjacent to the unit nameplate.

The markings for short-circuit and ground-fault protection always include some indication of the type of protection device as well as the maximum current rating. This is significant since the various types of devices recognized by the *NEC*® to provide this protection do not necessarily provide the same level of protection for all units. Briefly, if the marking indicates:

- 1) Only “Fuse,” then only fuses are to be used;
- 2) “Circuit Breaker” and “Fuse,” then either fuses or circuit breakers
- 3) “Fuse or Circuit Breaker” or “Overcurrent Protection,” then fuses or any type of circuit breaker (including “HACR Type”) may be used.

In any case, the devices used should be covered by the *NEC*® to provide short-circuit and ground-fault protection.

The maximum rating and type of protective device specified in the marking described above are those considered in the evaluation of the unit for Listing, and are intended to apply to the protective devices installed on the line side of the supply circuit conductors, not to protective devices factory installed in the unit.

18. BRANCH-CIRCUIT RATING

NEC® Section 424.3(A) indicates that branch circuits supplying two or more outlets for fixed electric space heating equipment shall be rated 15, 20, 25 or 30 amperes. Although this is rarely applicable to the type of equipment covered in this Guide, some units rated 16 amperes or less may not be suitable for connection to 20- or 30-ampere branch-circuits. Such units show the

maximum rating of the branch-circuit to which they are to be connected. This marking will be on or adjacent to the unit nameplate, or near the area where supply wires are to be connected.

19. INTEGRAL OVERLOAD PROTECTION FOR MOTORS

Most electrical heating and cooling equipment includes appropriate overload protection for each motor in accordance with Part C of *NEC*® Article 430. In many cases, the unit or the individual motor is marked to indicate that this protection is provided. Even if there are no such markings, it can be assumed that adequate protection is provided for each motor unless the unit markings indicate the need for remote devices to provide such protection (see “Remote Overload Protection for Motors”).

A unit with a thermally protected hermetic refrigerant motor-compressor always includes a marking in accordance with *NEC*® Section 440.4(A) to indicate the type of thermal overload protection provided for each motor-compressor. A unit that uses thermal protection complying with *NEC*® Sections 440.52(A)(2) and (B)(2) is marked “Motor-Compressor Thermally Protected,” or an equivalent statement to reference the motor-compressor(s) involved, unless the motor-compressor itself is marked “Thermally Protected.” When protection is provided by an integral protective system in a unit, complying with *NEC*® Sections 440.52(A)(4) and (B)(4), the unit is marked “Motor-Compressor Thermally Protected System,” or an equivalent statement to reference the motor-compressor(s) involved.

A unit that includes a 3-phase motor and overload protection for that motor other than an overcurrent unit in each motor supply conductor will provide adequate primary single-phase failure protection when supplied by transformers connected wye-delta or delta-wye. Such a unit is marked to indicate that the motor is protected under primary single-phasing conditions.

20. REMOTE OVERLOAD PROTECTION FOR MOTORS

Some units evaluated to determine the adequacy of specific motor controllers (starters) to provide motor overload protection may be shipped from the factory without the controller installed. For these units, UL requires that the manufacturer provide the proper controller for remote mounting, and the unit must be marked to identify this controller. The marking includes the controller manufacturer’s name, the model designation and the rating of the overcurrent (heater) element to be used in the overload relay of the controller. This marking is located either where field wiring connections to the controller are to be made, or on the wiring diagram attached to the unit (see “Wiring Diagram”).

Some units that contain a continuous-duty single-speed blower motor rated over 1 horsepower as the only load on a supply circuit need not include overload protection for that motor when:

- 1) The motor is located where it will not be adversely affected by high ambient air temperatures during normal use of the unit; and,
- 2) Energization of any electric space heaters in the unit cannot occur without the blower operating.

These units are marked to indicate the need for providing a remote controller with overload protection devices rated or selected for compliance with the installation codes specified by the jurisdictional authority.

Most air conditioning liquid chillers that use a centrifugal motor-compressor are not factory equipped with a controller or overload protection for that motor. In this case, the unit nameplate will indicate that these components are not provided and designate the manufacturer's specifications for the components to be installed remotely. The specifications include the electrical rating of the required controller, the start sequencing, the overload protection trip current and the connections to the chiller electrical control system. If a current transformer is to be provided as part of the controller to provide a signal input circuit to the chiller control system, the specifications will also include requirements for the current transformer and any necessary shunting resistor.

21. CONNECTION TO NONMETALLIC ENCLOSED WIRING

Most UL Listed equipment is provided with knockouts or openings designed to accommodate properly sized conduit fittings for any of the appropriate types of wiring systems covered by the *NEC*®. Some units, however, are designed only for connection to a system other than metal-clad cable or conduit. These units are marked to indicate the appropriate type of system or systems to be used. This marking will be visible when power supply connections are being made.

22. EQUIPMENT GROUNDING CONNECTION

Except as indicated below, every unit is required to have a means for connecting the equipment grounding conductor for each circuit, other than a Class 2 control circuit, to which the unit is to be connected. If a wire binding screw is provided for this purpose, it will have a green colored head. A pigtail lead for this purpose will be green and may have yellow stripes. A pressure type wire connector will be marked "G," "Gr," "Ground," "Grounding," or the equivalent, on or near the connector, or will be identified on the unit wiring diagram. The grounding terminal may be

identified by the symbol "⊕".

A unit that requires connection to a circuit with power supply conductors larger than No. 2 AWG does not have to be provided with means for connecting an equipment grounding conductor for that circuit. Such a unit may be grounded by an appropriate metallic raceway, but it will be marked "If This Unit Is Supplied By A Wiring System That, In Accordance With The National Electrical Code, Requires The Installation Of An Equipment Grounding Conductor Or Conductors, A Terminal Or Terminals For Connection Thereof Must Be Installed," or an equivalent statement.

23. FACTORY-PROVIDED WIRE CONNECTORS

Some units have pigtail leads for connection to supply or control circuit wiring when the unit is installed. To help provide a reliable splice, these leads are ordinarily no more than two wire sizes smaller than the minimum size copper conductor required by the *NEC*® for the external circuit. When two or more pigtail leads are to be connected to the same external circuit conductor, each pigtail may be more than two wire sizes smaller, if a suitable reusable wire connector, such as a twist-on wire connector, is factory-provided on the pigtails. If so, the unit is marked to indicate that the provided connector is to be used for field wiring splice connection.

Some units equipped with pigtail leads for splice connections to an external line voltage circuit have reusable wire connectors on these leads that may not be suitable for splicing to properly sized external circuit wiring. These wire connectors may be used, for example, to insulate lead ends, not necessarily used in every installation. Such units are marked to indicate that these wire connectors are not for field wiring connections.

Either type of marking described above will be located in the field wiring area where plainly visible during installation and inspection.

24. COPPER OR ALUMINUM WIRING

Units provided with terminals for field-connected wiring are marked to indicate the use of copper conductors only or whether aluminum and/or copper clad aluminum conductors may also be used. This marking is independent of any marking on the terminals and visible during unit installation and inspection after unit installation. Such a marking is typically located on a surface adjacent to the terminals or included on the attached unit wiring diagram. The conductor material(s) specified by the marking applies to the wires connected to the unit itself. Other conductor materials, however, may be used elsewhere in the circuits supplying the unit, provided that proper consideration is given to ampacities, splicing methods, etc.

25. TEMPERATURE RATING OF FIELD INSTALLED WIRING

For some equipment, the testing and construction are based on the use of wiring with 75°C insulation. However, most equipment, where ampacities of 100 or less are involved, is marked for use with 75°C rated conductors at 75°C ampacities. The use of wiring with 75°C insulation is necessary when conductor ampacities higher than 100 are required. When the use of wiring with insulation rated higher than 75°C (or 75°C) is required because of terminal or wiring compartment temperatures, the equipment must be marked to specify the minimum temperature rating (90°C) and the minimum conductor size of the wires unless the conductor size is to be based on the 75°C wire ampacity. Such markings are located adjacent to the field-wiring connection point or on an attached wiring diagram and are visible while making the connections and after they have been made. Some equipment is marked to indicate an area for locating field wiring and splices to prevent excessive insulation temperatures.

26. WIRING DIAGRAM

Most units have an attached wiring diagram. Such a diagram is required on a UL Listed unit when the method of connection to the electrical supply is not obvious, or if it is necessary to electrically connect an accessory or other remote load to the unit. Also, such a diagram is always required on a duct heater and includes the proper external connections for interlocking with the blower motor to insure compliance with *NEC*® Section 424.63. Many of the other markings concerning proper field-wiring connections described elsewhere in this Guide may be included in this wiring diagram.

27. CONNECTION TO LOW VOLTAGE SUPPLY SOURCE

Some units require an external supply source for low -voltage control circuits. The required voltage rating of this source (typically 24 volts) will be identified on the unit wiring diagram (see “Wiring Diagram”) or by a marking adjacent to the terminals or leads to which the supply wires

are to be connected. The minimum necessary capacity rating of the supply transformer will also be included in this marking unless it is less than 5 volt amperes. If the supply is required to be a limited energy type because of wiring or loads within the unit, the marking will also indicate this (e.g., “Class 2,” etc.).

28. EXTERNAL DEVICES AND/OR WIRING IN LOW VOLTAGE CIRCUITS

Many units are intended for connecting external low-voltage control circuit switching devices and wiring. If the power supply for such a circuit is part of the unit and the unit is marked Class 2 the circuit is a Class 2 control circuit per *NEC*® Article 725 and may be wired accordingly. If external to the unit, the type of supply source will determine the external wiring and components to be used as explained in Section 27.

If the type of unit transformer, the function of the control circuit, or other items require that the circuit be treated as a Class 1 control circuit, the unit will be marked “Wire Per NEC Class 1” or the equivalent. This marking is located on the attached wiring diagram (see “Wiring Diagram”) or in the immediate vicinity of the terminals or leads provided for connection to the control circuit.

29. MULTIPLE CLASS 2 SUPPLIES

A unit with a built-in transformer that provides a Class 2 control circuit supply for connection to a heating/ cooling thermostat or an equivalent device will be marked to indicate that isolation shall be maintained between this circuit external to the unit and separate external Class 2 output circuits. This marking may be a part of the wiring diagram (see “Wiring Diagram”) that shows the proper wiring connections necessary to maintain this separation, or it may be a statement such as “Use Thermostat With Isolating Contacts To Prevent Interconnection Of Class 2 Outputs.” The statement may be located in the immediate area of the unit’s field-wiring Class 2 circuit connections, or on the unit wiring diagram.

A unit that contains two or more built-in transformers to supply separate external Class 2 control circuits is marked similarly to warn that separation must be maintained between these circuits external to the unit.

Failure to heed these markings can result in control circuits exceeding the limitations for Class 2 control circuits as defined in *NEC*® Article 725.

30. INSTALLATION CLEARANCES

Many types of units require clearances between the cabinet and attached duct work, and combustible materials. These clearances are required to be marked on the unit nameplate. The required clearances are given in inches.

Except units that show “Duct Heater” as the product identity with the Listing Mark, all equipment with electric resistance space heaters is marked with the required clearance even if the “clearance” is zero.

Duct heaters need to be marked only with required clearances that are greater than zero. All duct heaters rated 50 kilowatts or less, however, are required to be suitable for zero clearance

installations.

Designated clearances other than zero are based on tests with uninsulated sheet metal ducts attached. Under these conditions, temperatures not higher than established maximum values have been measured on a wooden test enclosure, representing combustible construction, with the specified clearance (air) from the unit and ducts. When clearances are required between an attached outlet duct and combustible materials, the marking usually specifies the length of duct beyond the plenum or unit cabinet from which clearances must be maintained. If no distance is specified, the clearances need not be maintained from the portions of duct that are more than 6 feet from the plenum.

31. STATIC PRESSURE

The external static pressure imposed by the duct system attached to a unit can affect the unit air flow adversely. UL tests equipment at a high enough static pressure to take into account the effect of typically connected duct work; the minimum test static required is based on the rated heating and/or cooling capacity of the equipment. Tests on larger equipment require higher static pressures to account for the anticipated use of longer, more complex duct systems. Some units are marked to indicate the static pressure at which they were tested.

32. REFRIGERANT TYPE

Units employing a compressor with or without a refrigerant coil indicate the refrigerant to be used for field charging and the refrigerant used for any factory charge (see “Refrigerant Amount”). This designation is a number in accordance with ASHRAE Standard 34, or UL 2182, the Standard for Refrigerants, and is either prefixed or suffixed by the word “Refrigerant” or prefixed by the letter “R” or the trade name of the refrigerant. The use of a refrigerant type other than one designated in the marking is not covered by the UL Listing of the unit, except as noted in the section “Refrigerant Retrofit.” Units without a compressor need not be marked with the refrigerant type.

33. REFRIGERANT AMOUNT

The nameplate on a unit containing a refrigerant compressor is marked with information concerning the amount of refrigerant. For a self-contained unit with the full amount of refrigerant needed for proper operation of the system, the marking will state the factory refrigerant charge weight.

A unit requiring field charging that is a section of a complete system Listed by UL (see “Split-Systems”), or one that contains a complete refrigerant system is marked to show the correct refrigerant charge weight or how to determine the correct charge. The marking to show how to determine the correct charge may refer to other markings on the unit or to the installation instructions. In either case, the nameplate always includes a blank for the installer to mark the total system charge weight.

UL Listed units that do not contain the complete refrigerant systems and are not a section of a complete system Listed by UL, merely include a blank on the nameplate for the installer to mark the total system charge weight.

33A. REFRIGERANT RETROFIT

The information marked on the equipment nameplate relative to refrigerant type and amount of refrigerant is critical when equipment is to be evaluated using the installation requirements of ASHRAE 15, “Safety Code for Mechanical Refrigeration.” In these cases, the information in the ASHRAE standard, such as refrigerating system classification, table of allowable refrigerants and amounts, and system application requirements, is used to make calculations that ensure that the refrigerant type and amount are suitable for the application, the size of the room, the type of occupancy, etc.

In view of the national and international environmental protocol restrictions on the use of ozone-depleting chemicals and the increasing availability of alternative refrigerants, situations will arise in the field for which the equipment’s original refrigerant is retrofitted with another type of refrigerant. The amount of the new refrigerant may also change from the amount of original refrigerant used.

In some cases, the alternative refrigerant being retrofitted will not be included in the ASHRAE 15 standard. For the interim period, until such time as the ASHRAE standard can be revised, information (such as allowable amounts per cu. ft. of space) has been included in the UL Listing Report covering the equipment. This information may be obtained from the equipment manufacturer.

34. REFRIGERANT PRESSURE

A unit with refrigerant-containing components is marked to indicate the pressure for which the refrigerant system or any of its components were factory tested for leakage. Separate test pressures may be marked for the discharge (high) and suction (low) sides of the system. The pressure is identified as “Design Pressure” and appears on the unit nameplate.

These pressure markings are of little concern to installers or inspectors when the unit involved is one of the following:

- 1) A unit that is marked to indicate that it is factory charged (see “Refrigerant Amount”);
- 2) A unit serving as a section of a UL Listed system (see “Split-Systems”) charged with the correct refrigerant type and amount (see “Refrigerant Type” and “Refrigerant Amount”); and,
- 3) A unit containing a complete refrigerant system charged with the correct refrigerant type and amount.

For these types of units, the factory test pressure is adequate for the factory charge or the designated field charge.

For other types of units, the adequacy of the factory test pressure may need to be determined by measurements on the installed system.

A unit requiring connection to a remote condenser that is not part of a UL Listed system is also marked to specify the minimum design pressure of the remote condenser. To comply with this specification, the “Design Pressure” marked on the condenser should be at least as high as the minimum design pressure specified, and the condenser should be the type specified.

35. HEATING AND COOLING COILS

Equipment intended to employ water or steam as a heat exchange medium for the conditioned air is required to be marked with the fluid type(s) for which it has been evaluated. If a coil is for hot (or both hot and cold) water, the marking indicates the maximum permissible inlet water temperature. If the coil is for steam, or for water at a temperature exceeding 200°F, the marking indicates the maximum permissible pressure. If the coil is for cooling only, this information is marked. Such markings are generally located in the area where piping connections are made to the unit.

36. SUITABLE FOR OUTDOOR USE

A unit evaluated for outdoor installation is identified by a marking “Outdoor Use” or equivalent statement on or near the nameplate. These units are investigated for adequate corrosion protection and the ability of the enclosure to prevent accumulation of water, which could result in risk of electric shock or fire. Some equipment such as a through-the-wall unit, is marked to indicate that only a portion of the unit may be mounted outdoors. Equipment that is UL Listed for outdoor use is identified either by an appropriate footnote or by the designation of the Listed equipment (i.e., outdoor section) in UL’s published Listings. A unit not marked as indicated above is UL Listed for indoor installation only.

37. MOUNTING POSITION

The intended mounting position of most units is obvious from their construction and/or position of their unit markings. For some equipment, particularly duct heaters, the mounting position is not obvious. Most duct heaters are suitable for mounting in either horizontal or vertical ducts. All duct heaters and some similar types of equipment are required to be marked with their acceptable mounting positions (e.g., “This Side Up In Horizontal Duct,” “This Side Up In Vertical Duct,” etc.). Other equipment, such as indoor air handlers, are often investigated and UL Listed for mounting in several positions (e.g., upflow, downflow, horizontal).

For some types of equipment, including all units incorporating electric resistance space heaters, it is particularly important that the unit be oriented properly, as to which side is up when mounted in the horizontal position.

Note that a unit suitable for mounting in any one of several positions sometimes may be properly installed with the markings located sideways or upside down. If there is any question concerning the mounting position of a UL Listed unit, and there are no markings on the unit to indicate that it may be mounted in this position, consult the manufacturer’s installation instructions. UL reviews the instructions packaged with the unit as part of its investigation.

38. AIR FLOW DIRECTION

For some duct heaters, proper operation of the temperature limiting devices is dependent on the direction of air flow across the heating elements. Such units are marked with an arrow and appropriate wording to indicate the proper direction of air flow.

39. AIR VELOCITY

Proper operation of electric resistance space heaters is dependent on the quantity of air moving past the elements. The adequacy of the air moving means is determined as part of the investigation of all central electric space heating equipment Listed with specific fans or blowers. This pertains to units with both heaters and blowers factory installed and to units marked to indicate the use of field-installed heater accessories (see “Use of Accessories”).

Multispeed Blower Motors

Some units designed for field-installed heaters use a multispeed blower motor, and it may be necessary to adjust the fan speed when certain heaters are installed. Such equipment is marked to indicate the need for this change, and details showing how to accomplish it are included in markings, usually on the wiring diagram.

Large Commercial/Industrial Equipment

Some very large commercial and industrial type equipment with fixed electric space heating use belt-driven, adjustable speed blowers. The manufacturer’s installation instructions include directions for setting the blower speed based on the external static pressure. UL verifies these instructions as part of its product investigations, and these instructions should be followed to assure adequate air flow.

Duct Heaters

One type of unit UL does not investigate for use with specific air moving equipment is a duct heater. *NEC*® Section 424.59 requires provision of uniform and adequate air flow over the face of the heating elements in a duct heater. Every duct heater is marked to indicate the minimum required air flow. This marking may include the specific minimum velocity, but in most cases, it will reference the installation instructions for details. The installation instructions typically include a chart or graph showing the minimum required air flow based on the heater kilowatt rating and the temperature of the air entering the heater. They also include directions for using the graph, and generally at least one example. The manufacturer’s instructions, packaged with the heater, are reviewed as part of the UL investigation. It is important that they be followed, as also indicated in *NEC*® Section 424.66.

Minimum air velocities for duct heaters are usually specified in feet per minute, but may be specified in cubic feet per minute, if the duct heaters are to be installed only in a duct of the same size as the heater. The installation instructions should be consulted for any restrictions in this regard.

NEC® Section 424.59 states that the airflow shall be uniform as well as adequate. Another factor that should not be overlooked is the fine print note in *NEC*® Section 424.59. Generally, an unobstructed straight run of duct at least 4 feet long on the inlet side of the heater is adequate to insure fairly uniform air flow across the duct area. Obstructions on the outlet side of the heater, however, can also affect uniformity of airflow. Published information for Duct Heaters (KOHZ) in the UL White Book offers some additional guidance.

40. INLET AIR TEMPERATURE

UL’s investigation of most equipment is based on the assumption that the air entering an indoor unit is at normal room temperature. UL tests are conducted with inlet air temperatures of 80°F.

Some indoor units are investigated and Listed for connection to duct systems where the air entering the unit is preheated by some other means. Since duct heaters are typically used in such installations, any unit identified as a “Duct Heater” as part of the Listing Mark is marked to indicate a maximum entering air temperature (see *NEC*® Section 424.60). For some duct heaters, this marking may reference the installation instructions that, as indicated elsewhere in this Guide, have been investigated as part of the Listing and should be consulted. Fan units may also be used in applications where the inlet air is preheated, and if tested to cover this application, will also be marked to indicate a maximum entering air temperature. If not so marked, a maximum entering air of 80°F is assumed. Use of equipment in systems that preheat inlet air to a temperature higher than its marked maximum inlet temperature, or 80°F if not marked, can result in overheating of wiring, electrical components and duct work.

41. DUCT CONNECTIONS

Units designed to be connected to a duct system for conditioned air are Listed for installation in accordance with the applicable portions of the National Fire Protection Association Standard for Installation of Air Conditioning and Ventilating Systems, NFPA 90A, and/or the Standard for Warm Air Heating and Air Conditioning Systems, NFPA 90B. Certain unit markings may limit the types of installations permitted by these Standards.

NFPA Standards 90A and 90B permit certain types of residential installations of nonheating equipment without a noncombustible duct or equivalent barrier beneath a bottom air discharge or return air opening in a unit. A unit that does not include a means of heating but requires such a barrier is marked “For Nonresidential Installation Only.”

A unit not investigated for connection to a duct system as defined in these Standards, may be marked “This Unit Is Intended Only For Free-Air Discharge Or For Connection To A Duct Supplying Only One Room.”

Certain types of equipment that cannot be properly installed with attached duct work in rooms having a ceiling height of 7-1/2 feet or less may be marked to indicate the minimum required ceiling height.

42. SHORT-CIRCUIT CURRENT RATING

NEC® Section 440.4(B), now requires that multimotor and combination-load equipment shall be provided with a visible nameplate marked with the short-circuit current rating, with the following exception:

Multimotor and combination-load equipment used in one and two family dwellings, cord and attachment plug connected equipment, or equipment supplied from a branch circuit protected at 60 amps or less shall not be required to be marked with a short-circuit current rating. All these types of markings described above are located on or adjacent to the unit nameplate.

43. CARBON DIOXIDE (R744) AS A REFRIGERANT

Equipment intended to utilize carbon dioxide (R744) in a secondary loop or a cascade system as a heat exchange medium for the conditioned air is required to be marked with the fluid type(s) for which it has been evaluated. If the equipment is for use with R744 (carbon dioxide) system components, the marking indicates the design pressure of the equipment is not less than the design pressure of the associated components.

If the equipment contains a pressure vessel within the R744 loop or system, but pressure relief and pressure-regulating relief valves are not provided as part of the equipment, a marking shall be located where visible to the installer indicating that pressure-relief or pressure-regulating relief valves are not installed on the equipment and that a sufficient number of valves having capacity deemed adequate shall be field-installed on the system.

Pressure-regulating relief valves shall be provided with the following or equivalent marking: "Do not defeat, cap, add piping to the outlet of the valve or attempt to change the relief setting."

44. MOTORS FOR USE WITH SOLID-STATE SPEED CONTROLS

Motors intended for use with remotely located solid-state speed controls for Heating & Cooling equipment is requires to be marked with the following statement, "SUITABLE FOR USE WITH ANY SOLID-STATE SPEED CONTROLS" or equivalent wording. If a speed control is specified by the manufacture, the marking is not required.

45. HEAT PUMP WATER HEATING EQUIPMENT

Heat pump water heating equipment that have a heat exchanger are required to be marked with following, If the heat exchanger is intended for connection to a potable water system, it shall be of double wall construction and the design shall incorporate either a vented interface or redundant construction to prevent the leakage of refrigerant into potable water, the equipment shall be marked with the following, or the equivalent: "CAUTION: DOUBLE WALL HEAT EXCHANGER, SUITABLE FOR POTABLE WATER CONNECTION". Heat exchangers may be of single wall construction provided they are not intended for connection to a potable water system, and shall be marked with the following, or the equivalent: "CAUTION: SINGLE WALL HEAT EXCHANGER, NOT SUITABLE FOR POTABLE WATER CONNECTION".

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APPENDIX A

UL HEATING AND COOLING EQUIPMENT PRODUCT CATEGORIES

UL does list this type of equipment and continues to develop new product categories to address the safety issues associated with this type of equipment. Below is a list of product categories that UL currently lists to address these types of products. Each product category is tabulated with a UL Category Code. By clicking on the code, you will be linked to the UL Guide Information for the category and any Listings or Classifications under that Product Category in the UL Online Certifications Directory database at www.ul.com/database.

Category Code	Category Name	Standard Used
Electric Heating and Cooling Equipment		
KTFV	Absorption Air Conditioning Equipment	UL 1995, UL 795, UL 296, ANSI Z21.40.1
ACKZ	Air conditioners, packaged terminal	UL 484, ANSI Z21.86
ABFY	Air conditioning equipment accessories	UL 1995
KZZV	Central furnaces	ANSI Z21.47
KOHZ	Duct heaters	UL 1996
LZPG	Ductless heating and cooling equipment, large, open building	UL 1995
LZPU	Heater assemblies Classified for use on Specified Equipment	UL 1995
LZFE	Heating and Cooling Equipment	UL 1995
KMLW	Remote control panels for electric duct heaters	UL 1996
KKWS	Room Air Heaters, Fixed and Location Dedicated	UL 2021
ACVS	Special purpose air conditioners	UL 484
MJAT	Specialty heating and heating-cooling appliance accessories	UL 1995, UL 462, UL 207, UL 295, UL 795, UL 296
Gas-Fired Heating and Cooling Equipment		
LLRR	Commercial radiant heaters	ANSI Z83.19 or Z83.20
LKQA	Outdoor patio heaters	ANSI Z83.26
LTCT	Unit heaters	ANSI Z83.8
LPOL	Unvented room and log heaters	ANSI Z21.11.2
LPNH	Vented room heaters	ANSI Z21.86
LPPM	Vented fireplace heaters	ANSI Z21.88
Solid-Fuel-Fired Heating and Cooling Equipment		
LBHZ	Solid-fuel-fired central furnaces	UL 391
DGAW	Solid-fuel type room heaters	UL 1482
Oil-Fired Heating and Cooling Equipment		
LGJR	Floor furnaces	UL 729
LUDZ	Unit heaters	UL 731
Kerosene-Fired Heating and Cooling Equipment		
LQLT	Room heaters	UL 896
Combination-fired Heating Equipment		
LANT	Gas-Oil-Fired Central furnaces	ANSI Z21.47 and UL 727
LTQR	Gas-oil-fired unit heaters	ANSI Z83.8 and UL 731
LBEV	Solid-fuel Combination central furnaces	UL 391

APPENDIX B: HEATING AND COOLING EQUIPMENT CODES AND STANDARDS

Heating and cooling equipment must be installed in accordance with model codes and installation standards. These codes require these products to be listed and labeled in accordance with applicable product standards.

UL standards are typically identified as Standards for Safety and cover reasonably foreseeable risks associated with a product. Limitations applicable to the products covered by the standard are delineated in the Scope section of the standard. UL standards are intended to:

- Identify requirements for evaluation of products and provide consistency in the application of these requirements.
- Provide guidance for development of products by manufacturers.
- Provide requirements compatible with nationally recognized installation codes

An UL Outline of Investigation is a document that contains the construction, performance, and marking criteria used by UL to investigate a product when the product is not covered by the scope of an existing UL Standard for Safety. Outlines are not consensus documents and do not require review by an UL Standards Technical Panel (STP) or other external group.

ANSI Z21.11.2	Gas-Fired Room Heaters, Volume II, Unvented Room Heaters
ANSI Z21.47	Gas-Fired Central Furnaces
ANSI Z21.86	Vented Gas-Fired Space Heating Appliances
ANSI Z21.88	Vented Gas Fireplace Heaters
ANSI Z83.8	Gas Unit Heaters and Gas-Fired Duct Furnaces
ANSI Z83.19	Gas-Fired Low-Intensity Infrared Heaters
ANSI Z83.20	Gas-Fired High-Intensity Infrared Heaters
ANSI Z83.26	Gas-Fired Outdoor Infrared Patio Heaters
IFGC	International Fuel Gas Code
IMC	International Mechanical Code
NEC (NFPA 70)	National Electrical Code
NFGC (NFPA 54)	National Fuel Gas Code
UL 207	Refrigerant-Containing Components and Accessories, Nonelectrical
UL 295	Commercial-Industrial Gas Burners
UL 296	Oil Burners
UL 391	Solid-Fuel and Combination-Fuel Central and Supplementary Furnaces
UL 462	Heat Reclaimers for Gas-, Oil-, or Solid Fuel-Fired Appliances
UL 484	Room Air Conditioners
UL 727	Oil-Fired Central Furnaces
UL 729	Oil-Fired Floor Furnaces
UL 731	Oil-Fired Unit Heaters
UL 795	Commercial-Industrial Gas Heating Equipment
UL 896	Oil-Burning Stoves
UL 1482	Solid-Fuel Type Room Heaters
UL 1995	Heating and Cooling Equipment
UL 1996	Electric Duct Heaters
UL 2021	Fixed and Location-Dedicated Electric Room Heaters
UMC	Uniform Mechanical Code



Marking and Application Guide

LUMINAIRES

JANUARY 2013

PREFACE

UL has developed this guide for use by code and inspection authorities, electric utilities, contractors, installers, users, system designers, and other interested parties to aid in understanding the basic components of luminaires and the applicable codes and standards in order to facilitate a reasonably safe and code-compliant installation.

This Luminaire Marking Guide contains information to make it easier to locate specific markings. The guide consists of 77 notes indexed by both luminaire type and subject matter. Each note describes a marking and briefly explains the meaning and terminology of the marking. This edition has been updated in accordance with the 2011 National Electrical Code (NEC)® and UL Luminaire Standards revisions through September 17, 2008.

UL Marking Guides are updated as necessary due to new product development, changes in the codes, or the need for clarification. To confirm the current status of any UL Marking Guide, please consult the Code Authorities page of the UL Web Site at <http://www.ul.com/codeauthorities>.



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INTRODUCTION

USE OF THIS GUIDE

This guide is intended to assist regulatory authorities, designers, and installers in determining the suitability of specific luminaires in a particular installation and use, and to address concerns related to fire, shock, and mechanical hazards.

Products are Listed or Classified by UL under an appropriate product category. A four-letter code (shown in parenthesis) following every category title in this guide is the UL product category code designation.

Each UL product category code provides a direct link to the Guide Information for the product category. The Guide Information includes the scope of the products covered, information relating to limitations or special conditions applying to the product, the requirements used for the investigation of the products, installation and use information, and information on product markings and the UL Mark to be used on the product. Guide information is available in the UL White Book and online at www.ul.com/database.

The product markings identified in this guide do not include every possible marking that could be provided either on a product or in its installation or operation instructions. The purpose of these markings is to provide you with an indication of the type of text and location of markings that address features that may be critical in determining if a product is certified and / or if it is installed correctly. Refer to the specific Guide Information for the product category for additional marking information.

The numbering for code sections used in this document may change as the specific code is updated.

Additional information can be found at www.ul.com.

INFORMATION ON LISTING VERSUS CLASSIFICATION

Most codes and regulations require the certification of this equipment to applicable safety-related standards. They also may require this equipment to be certified to energy performance standards as well. Products that are certified to safety-related standards have been evaluated with regard to all reasonably foreseeable safety-related hazards, including fire, electrical shock and mechanical hazards. Such products are termed “UL Certified” or “UL Listed.” Products that are certified to a limited range of hazards, or for use under specific conditions are termed “UL Classified”.

It is important to distinguish the difference between “UL Certified” or “UL Listed” and “UL Classified” and the relation these terms have with the term “listed,” as used in various codes. The term “listed” in the codes generally indicates that the product is required to be evaluated in accordance with the appropriate standard(s) by an independent third party certification organization such as UL. The term “listed” in the codes should not be confused with the term “UL Listed,” as explained above. It is important to recognize that not all certification agencies make this distinction in their certification services.

INFORMATION ON UL MARKS

There are several types of UL Marks that can be found on luminaires. General information on each of these Marks is provided below. Each has its own specific meaning and significance. The only

way to determine if a product has been certified by UL is to look for the UL Mark on the product itself.

The UL Mark on a product means that UL has tested and evaluated representative samples of that product and determined that they meet the requirements in the applicable standard(s). Under a variety of UL programs, certified products are periodically checked by UL at the manufacturing facility to determine that they continue to comply with the standard(s).

The UL Marks may only be used on, or in connection with products certified by UL, and under the terms of a written agreement between the manufacturer and UL.

UL Listing Mark

This is one of the most common UL Marks. If a product carries this Mark, it means UL found that representative samples of this product met UL's *safety* requirements. These requirements are primarily based on UL's own published Standards for Safety, or other recognized third party standards. The UL Listed Mark includes the UL symbol, the word "Listed," the product or category name, and a control number assigned by UL.



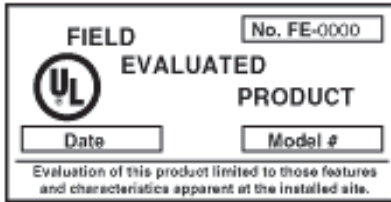
UL Classification Mark

This Mark appears on representative samples of products that UL has evaluated but only with respect to specific properties, a limited range of hazards, or suitability for use under limited or special conditions. The UL Classified Mark includes the UL symbol, the word "Classified," a statement of the scope of evaluation, the product or category name, and a control number assigned by UL.



FIELD EVALUATIONS

You may encounter situations in which you are unable to determine if a product has been listed by a third-party organization. Or in other situations you might encounter a product bearing a listing label that may have been modified in the field, and now you question whether or not the product still complies with the applicable standard. UL offers a field evaluation service that provides data to assist you in making your decision whether to accept the product and/or approve the installation. Anyone directly involved with a product – including manufacturers, owners, contractors, and regulatory authorities – can request a Field Evaluation. Detailed information for this program can be found on UL's Web site at www.ul.com/field.



INDEX BY LUMINAIRE TYPE

INCANDESCENT SURFACE MOUNTED LUMINAIRES

Category Code Guide Designation: IEZR

Listing Mark ID: Luminaire

In addition, specific type marked elsewhere on the product; e.g. "Incandescent"

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INCANDESCENT RECESSED MOUNTED LUMINAIRES

Category Code Guide Designation: IEZX

Listing Mark ID: Luminaire

In addition, specific product identifier marked elsewhere on the product; e.g. “Recessed Incandescent”, “Recessed Incandescent Type IC”, “Rough-In Section For Recessed Type IC”, or “Finishing Section For Recessed”

MARKINGS	ENVIRONMENTAL LOCATION MARKINGS	NOTE
Dry Locations		1
Damp Locations		2
Wet Locations		3
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+ Note: Classified Trims are covered under the category Recessed Luminaire Trims (IFGW)

FLUORESCENT SURFACE MOUNTED LUMINAIRES

Category Code Guide Designation: IEUZ

Listing Mark ID: Luminaire

In addition, specific product identifier marked elsewhere on the product; e.g. “Fluorescent”, “Wired Fluorescent Channel”, “Wired Fluorescent Reflector”, or “Wired Fluorescent Channel”

MARKINGS

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Line Volt-Amperes	50
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USER MARKINGS

Integral Starters	67
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Fuseholder	77

++ Note: Reflector Kits are covered under the category Luminaire Coverisons, Retrofit (IEUQ)

FLUORESCENT RECESSED MOUNTED LUMINAIRES

Category Code Guide Designation: IEVV
Listing Mark ID: Luminaire

In addition, specific product identifier marked elsewhere on the product; e.g. “Recessed Fluorescent”, “Recessed Fluorescent Channel”, “Wired Recessed Fluorescent Reflector”, Wired Recessed Fluorescent Channel” or “Wired Fluorescent Recessed Section”

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Damp Locations	2
Wet Locations	3
Installation Instructions	4

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Not For Use In Dwellings	6
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Integral Starters	67
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Fuseholder	77

HID SURFACE MOUNTED LUMINAIRES

Category Code Guide Designation: IEXT
Listing Mark ID: Luminaire

In addition, specific product identifier marked elsewhere on the product; e.g. "HID", or "Wired HID Section"

MARKINGS	NOTE
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ENVIRONMENTAL LOCATION MARKINGS

Dry Locations	1
Damp Locations	2
Wet Locations	3
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RESTRICTED LOCATION MARKINGS

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Ground ID	51
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USER MARKINGS

Lamp Replacement Markings	66
Hid Lamp Voltage	68
Double-Ended Lamps	69
Photoelectric-Controlled Switch	75
Convenience Receptacle	76
Fuseholder	77

HID RECESSED MOUNTED LUMINAIRES

Category Code Guide Designation: IEXZ

Listing Mark ID: Luminaire

In addition, specific product identifier marked elsewhere on the product; e.g. “Recessed HID”, “Recessed HID Type IC”, “Rough-In Section For Recessed HID”, “Rough-In Section For Recessed HID Type IC”, “Finishing Section for Recessed HID”, or Wired Recessed HID Section”

MARKINGS

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Damp Locations	2
Wet Locations	3
Installation Instructions	4

RESTRICTED LOCATION MARKINGS

Not For Use In Dwellings	6
Wall Mounting Only	7
Non-Fire-Rated Recessed Ceilings Only	10
Fire Resistant Construction Only	11
Poured Concrete Only	12

PERMISSIVE LOCATION MARKINGS

Suitable For Use In Poured Concrete	13
Suitable For Use In Suspended Ceilings	14

SPECIAL USE MARKINGS

Commercial Cooking Hood Use	17
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RECESSED LUMINAIRE MARKINGS

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USER MARKINGS

Lamp Replacement Markings	66
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Double-Ended Lamps	69
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INCANDESCENT RECESSED LUMINAIRES, CONVERTIBLE - NON-IC/IC

Category Code Guide Designation: IFAH

Listing Mark ID: Luminaire

In addition, specific product identifier marked elsewhere on the product; e.g. "Recessed Incandescent Convertible Non-IC/IC", "Recessed Incandescent Convertible Non-IC/IC Rough-In Section", "Recessed Incandescent Convertible Non-IC/IC Finishing Section"

MARKINGS	NOTE
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Damp Locations	2
Wet Locations	3
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Not For Use In Dwellings	6
Wall Mounting Only	7
Non-Fire-Rated Recessed Ceilings Only	10
Fire Resistant Construction Only	11
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Ground ID	51
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RECESSED LUMINAIRE MARKINGS

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Lamp Replacement Markings	66
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Recessed Luminaire Lamp Replacement Markings	72
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Fuseholder	77

LIGHT-EMITTING DIODE SURFACE MOUNTED LUMINAIRES

Category Code Guide Designation: IFAM

Listing Mark ID: Luminaire

In addition, specific type marked elsewhere on the product; e.g. "LED"

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USER MARKINGS

Photoelectric-Controlled Switch	75
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LIGHT-EMITTING DIODE RECESSED MOUNTED LUMINAIRES

Category Code Guide Designation: IFAO

Listing Mark ID: Luminaire

In addition, specific product identifier marked elsewhere on the product; e.g. “Recessed LED”, “Recessed LED Type IC”, “Rough-In Section For Recessed Type IC”, or “Finishing Section For Recessed”

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Fire Resistant Construction Only	11
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PERMISSIVE LOCATION MARKINGS

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+ Note: Classified Trims are covered under the category Recessed Luminaire Trims (IFGW)

TRACK LIGHTS AND TRACKS

Category Code Guide Designation: IFFR
Listing Mark ID: Track Lighting Fittings”

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ENVIRONMENTAL LOCATION MARKINGS

1. **DRY LOCATIONS** — A luminaire intended for use in a location not normally subject to dampness, but may include a location subject to temporary dampness, as in the case of a building under construction, provided ventilation is adequate to prevent an accumulation of moisture is marked “DRY LOCATIONS ONLY.”
2. **DAMP LOCATIONS** — Only luminaires marked “SUITABLE FOR DAMP LOCATIONS” or “SUITABLE FOR WET LOCATIONS” are intended to be installed in damp locations. A damp location is an exterior or interior location that is normally or periodically subject to condensation of moisture in, on, or adjacent to, electrical equipment, and includes partially protected locations.
3. **WET LOCATIONS** — Only luminaires marked “SUITABLE FOR WET LOCATIONS” are intended to be installed in wet locations. A wet location is a location in which water or other liquids may drip, splash or flow on or against electrical equipment. A luminaire marked “SUITABLE FOR WET LOCATIONS” may be additionally marked as specified below:
 - a. **Covered Ceiling Mount Only** — A wet locations luminaire marked “COVERED CEILING MOUNT ONLY” is intended for locations such as a vehicle washing area where the luminaire will not be subjected to water and precipitation from the back side. A ceiling mounted luminaire not identified for covered ceiling mount only is suitable for mounting in locations where it may be subjected to precipitation from the back side, such as under a metal grate-type catwalk.
 - b. **Less Than 1.2 M (4 Feet) Above Ground Level** — A wet locations wall or post mounted luminaire may be installed within 1.2 m (4 feet) of ground level if it is marked “SUITABLE FOR MOUNTING WITHIN 1.2 M (4 FEET) OF GROUND.” luminaires with this marking are intended to be subjected to water from lawn and garden sprinkler systems, but are not intended to be installed at or below ground level where they may be subjected to immersion in water.

Exception: A luminaire with an integral post (bollard type luminaire) needs to be so marked.
 - c. **Below Ground Level** — A wet locations recessed luminaire may be installed at or below ground level if it's marked “SUITABLE FOR GROUND-MOUNTED RECESSED.” A luminaire with this marking is intended to be subjected to infrequent immersion under water which may occur because of heavy precipitation. The luminaire is provided with instructions for its proper installation.
4. **INSTALLATION INSTRUCTIONS** — Installation instructions shall be provided for luminaires that require specific methods for sealing the mounting surface or specific fittings for supply connections.

RESTRICTED LOCATION MARKINGS

5. **OUTDOOR USE ONLY** — A fluorescent luminaire that is intended for outdoor use only is marked “OUTDOOR USE ONLY”. It is not required to have a Class P protected ballast.
6. **NOT FOR USE IN DWELLINGS** — An electric discharge luminaire that has a ballast with an output open circuit voltage greater than 1000V is marked “NOT FOR USE IN DWELLINGS”.

A luminaire marked for supply wire rated over 90°C is also marked “NOT FOR USE IN DWELLINGS.”

7. **WALL MOUNTING ONLY** — A luminaire that may be mounted only to a wall because of temperature, or other considerations, is marked “WALL MOUNT ONLY.”
8. **CEILING MOUNT ONLY** — track lighting luminaire assemblies intended for use with ceiling mounted track lighting systems only are marked “FOR USE WITH CEILING-MOUNTED TRACK ONLY.”
9. **NON-COMBUSTIBLE SURFACE ONLY** — A ceiling mounted or ground-mounted recess luminaire that is permitted to be mounted only to a noncombustible ceiling because of temperature or other considerations is marked “NONCOMBUSTIBLE SURFACE ONLY.”
10. **NON-FIRE-RATED RECESSED CEILINGS ONLY** — A recessed luminaire with a thermoplastic housing, or a housing with openings that exceed the maximum number or size permitted is marked “FOR USE IN NON-FIRE-RATED INSTALLATIONS ONLY.”
11. **FIRE RESISTANT CONSTRUCTION ONLY** — A recessed luminaire that produces a temperature rise greater than 65°C (117°F) on a mounting surface or recessed housing is marked “INSTALL IN BUILDINGS OF FIRE RESISTANT CONSTRUCTION - MOUNT ON NONCOMBUSTIBLE MATERIAL.”
12. **CONCRETE ONLY** — A recessed luminaire that is exempted from being thermally protected because it is intended for use only in a fire-resistant medium, such as concrete, is marked “FOR USE IN CONCRETE ONLY.”

PERMISSIVE LOCATION MARKINGS

13. **SUITABLE FOR USE IN POURED CONCRETE** — A recessed luminaire or track lighting system marked “SUITABLE FOR USE IN POURED CONCRETE” may be installed in poured concrete as well as in normal building materials.
14. **SUITABLE FOR USE IN SUSPENDED CEILINGS** — A recessed luminaire provided with means for mounting in a suspended ceiling may be installed in a suspended ceiling if marked “SUITABLE FOR SUSPENDED CEILINGS.”
15. **SUITABLE FOR UNDER CABINET MOUNTING** — A luminaire that is intended for mounting under a cabinet is marked “SUITABLE FOR UNDER-CABINET MOUNT.”

SPECIAL USE MARKINGS

16. **ELEVATED AMBIENT**— A luminaire intended for use in locations that experience a continuous elevated ambient temperature is marked “SUITABLE FOR OPERATION IN AMBIENT NOT EXCEEDING (___°C),” where the blank is filled in with the maximum ambient temperature.
17. **COMMERCIAL COOKING HOOD USE**— A luminaire intended for installation in non-residential occupancies in exhaust or hood ducts or hoods above cooking equipment, in accordance with the National Electrical Code and the Standard for Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment, NFPA 96, is marked with the minimum temperature rating of the supply wiring, and with the wording

“SUITABLE FOR USE WITHIN COMMERCIAL COOKING HOODS,” or the equivalent, and “MOUNT A MINIMUM OF 1.2 M (4 FEET) ABOVE COOKING SURFACE.” A recessed luminaire is additionally marked with the minimum acceptable spacing between the centers of adjacent units, the minimum spacing from the center of the luminaire to side building member, and the minimum spacing above the luminaire (see Item 55).

- 18. GERMICIDAL LAMP USE** — A luminaire intended for use with germicidal lamps is marked, “THIS LUMINAIRE IS DESIGNED FOR USE WITH GERMICIDAL LAMPS AND MUST BE INSTALLED IN COMPLIANCE WITH COMPETENT TECHNICAL DIRECTIONS SO THAT THE USER’S EYE AND BARE SKIN WILL NOT BE SUBJECTED TO INJURIOUS RAYS.”
- 19. AIR HANDLING USE** — A luminaire for use with heating, ventilating, and air conditioning systems in accordance with the National Electrical Code and the Standard for Installation of Air-Conditioning and Ventilating Systems of Other than Residence Type, ANSI/NFPA 90A, is marked, “SUITABLE FOR AIR HANDLING USE.” An air handling luminaire intended for cool air only is marked “COOLED AIR ONLY”. If the luminaire is shipped without a light diffuser, the luminaire is marked “USE WITH LISTED LIGHT DIFFUSER”. A plastic light diffuser or lens that depends on the luminaire for the provision of a frame and that is shipped separately from the luminaire is marked “USE WITH (manufacturer’s name) (catalog designation) LUMINAIRE.” For information on the use of air handling luminaires in fire rated constructions, refer to the design information section in the Fire Resistance Directory.
- 20. AIR HANDLING USE - EXCESSIVE OPENINGS** — A recessed luminaire intended for use as an air handling register and having a recessed housing with holes or openings that exceed the limits in size or number is marked “FOR NONCOMBUSTIBLE CEILING PLENUM ONLY.” A recessed luminaire that is intended for optional use as an air handling register and having a recessed housing with holes or openings that exceed the limits in size or number that are closed off by a removable cover or knockout is marked “ONLY FOR USE IN CEILING PLENUM OF NONCOMBUSTIBLE CONSTRUCTION OR WITH AIR HANDLING PARTS THAT COVER VENT OPENINGS.”

INSTALLATION MARKINGS

- 21. ADJUSTABLE MOUNTING POSITIONS** — A luminaire with adjustable or alternate mounting positions is marked to indicate the limits of adjustment or mounting positions necessary to comply with test requirements.
- 22. ORIENTATION** — If a luminaire that may be installed in more than one position has been evaluated for use only in one orientation, the luminaire is marked to indicate its proper orientation. This marking is typically provided on wet location and wall mount luminaires.
- 23. CHAIN OR HOOK SUSPENSION ONLY** — A luminaire with power supply cord that is not provided with hooks or chain is marked “FOR CHAIN OR HOOK SUSPENSION ONLY.”
- 24. ADAPTOR PLATE** — A recessed luminaire with an opening for an adapter plate but not shipped with the plate is marked with the catalog number or similar product identifier of the intended adapter plate.

- 25. CABLE WIRING METHOD ONLY** — A recessed luminaire with a wiring compartment (junction box) that is not suitable for pulling individual conductors into it and is intended for cable wiring methods only is marked “FOR CABLE USE ONLY - NOT FOR PULLING WIRES.”
- 26. PHOTOELECTRIC-CONTROLLED RECEPTACLE** — A luminaire provided with a receptacle for a photoelectric-controlled switch but not shipped with the photoelectric-controlled switch or with a shorting or open circuit plug is marked “INSTALL PHOTOCONTROL OR SHORTING PLUG.”
- 27. REFLECTOR KITS** — A reflector kit intended for installation in a fluorescent lighting luminaire sometime after the initial installation of the luminaire may consist of reflectors, electrical components and the like. A reflector kit that requires drilling or punching of holes into the luminaire is marked “WARNING — RISK OF FIRE OR ELECTRIC SHOCK. LUMINAIRE WIRING, BALLASTS, OR OTHER ELECTRICAL PARTS MAY

BE DAMAGED WHEN DRILLING FOR INSTALLATION OF REFLECTOR KIT HARDWARE. CHECK FOR ENCLOSED WIRING AND COMPONENTS.”
- 28. CORRELATION MARKINGS FOR TRACK SYSTEMS** — Track systems are composed of many individual sections. Each track section is marked “CAUTION — TO REDUCE THE RISK OF FIRE AND ELECTRIC SHOCK, USE ONLY LUMINAIRE ASSEMBLIES MARKED FOR USE WITH _____ TRACK.” The luminaire assemblies are marked “CAUTION — TO REDUCE THE RISK OF FIRE AND ELECTRIC SHOCK, USE ONLY WITH _____ TRACK.” The blank space is replaced by the manufacturer’s name and series number of the track.
- 29. NON-PENDANT** — A track lighting system that is not intended to be pendant mounted is marked “DO NOT PENDANT MOUNT THIS TRACK SUCH AS BY STEMS OR WIRES.”
- 30. INTEGRAL TO SUSPENDED CEILINGS** — A recessed track system intended to be an integral part of a building construction (for example, the recessed track is an integral part of a suspended ceiling grid) is marked “FOR USE IN _____.” The first blank is replaced by the name of the manufacturer making the building structural component. The second blank is replaced by the model number or other descriptive name of the building structural component.
- 31. CLIP MOUNT** — A track lighting system may be provided with track sections that are intended to be secured to the building structure only by clips. These sections are marked “FOR CLIP MOUNTING ONLY.”

INSTALLATION INSTRUCTIONS

- 32. CIRCUIT DIAGRAM** — luminaires are provided with instructions and a circuit diagram showing the proper method for making supply connections, including polarity and grounding, unless the luminaire carton is marked “THIS PRODUCT MUST BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE INSTALLATION CODE BY A PERSON FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE PRODUCT AND THE HAZARDS INVOLVED.”
- 33. POWER SUPPLY CORD** — A luminaire having a power supply cord that is electrically unconnected or unassembled to the luminaire is provided with instructions for the correct field assembly, including a means of strain relief and a wiring diagram.

34. INSTALLATION INSTRUCTION FOR CONVERTIBLE INCANDESCENT RECESSED LUMINAIRE—

A convertible recessed incandescent luminaire housing (rough-in section) is provided with instructions that tell the installer to remove the peel-off label with the text described in note 64, for Type IC installations.

35. INSTALLATION INSTRUCTIONS FOR TRACK SYSTEMS —

Each smallest unit package or carton of track assemblies is provided with installation instructions that contain (a) a product description, (b) a statement identifying which track system is to be used with the individual part, and (c) instructions on how the part or parts are to be installed in relation to the track system. Each track section is provided with installation instructions that identify the track system series number or model name, and the model catalog number of the track. The installation instructions also specify the electrical ratings of the track system and identify the mounting means (pendant, surface, etc.), and the distance between mounting clips, screws, stems, etc. Additional instructions and limitations of the use of track lighting systems are specified in the Important Safety Instructions provided with each track section.

36. DRILL GUIDE FOR TRACK SYSTEMS —

Those track systems designed such that mounting holes in each track section are to be drilled out by the installer are provided with a drill guide in the center of each track section. The proper location of the mounting holes is to be included in the accompanying installation instructions for the track system.

37. CUT TRACK SECTIONS —

Only those track systems with track sections that may be cut to length in the field by the installer are provided with installation instructions that indicate the proper method of cutting.

SUPPLY MARKINGS

38. SUPPLY WIRE TEMPERATURE —

luminaires that require greater than 60 °C supply wire are marked “MIN ____ °C SUPPLY CONDUCTORS” for which blank space is replaced with the temperature.

Luminaires intended to be installed in a dwelling, connected to or over an outlet box, and marked for supply wire rated 75°C or 90°C are additionally marked on the luminaire and on the carton “CAUTION - RISK OF FIRE. CONSULT A QUALIFIED ELECTRICIAN TO ENSURE CORRECT BRANCH CIRCUIT CONDUCTOR,” or just the carton may be marked “CAUTION – RISK OF FIRE. THIS PRODUCT MUST BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE INSTALLATION CODE BY A PERSON FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE PRODUCT AND THE HAZARDS INVOLVED.”

Track lighting systems that require supply wire with minimum temperature ratings are marked “FOR SUPPLY CONNECTIONS, USE WIRE RATED FOR AT LEAST ____ °C (____ °F)” for which the “(____ °F)” is optional and the blank space is replaced with the temperature.

39. PUSH LEADS INTO BOX —

Some surface-type wall mounted luminaires require the installer to push the supply leads into the outlet box to avoid contact with high luminaire temperatures, and are marked “PUSH CONDUCTORS INTO JUNCTION BOX”.

40. THROUGH CONDUCTORS IN A WIRING COMPARTMENT —

A luminaire that is suitable for use with through branch conductors is marked “MAXIMUM OF ____ NO. ____ AWG THROUGH

BRANCH CIRCUIT CONDUCTORS SUITABLE FOR ___°C PERMITTED IN BOX.”

41. **ACCESS REQUIRED** — A luminaire so constructed that the supply connections are accessible only from behind the luminaire is marked, “ACCESS ABOVE CEILING REQUIRED” or “ACCESS BEHIND WALL REQUIRED.”
42. **RACEWAY** — A luminaire may also be intended for use as a raceway if marked “SUITABLE FOR USE AS A RACEWAY.”
43. **PROPRIETARY WIRING SYSTEM** — A luminaire designed to be connected to a proprietary wiring system is marked with the following information:
 - a. The name and part number of the proprietary system to which the luminaire is to be connected.
 - b. All cautionary or other markings required by the system.
44. **REMOTE BALLAST** — A fluorescent or HID luminaire designed for use with a remote ballast is marked “USE BALLAST FOR ___ WATT ___ TYPE LAMP” where the blanks are filled with the lamp wattage and type, respectively. Additionally, a fluorescent luminaire designed for use with a remote ballast is marked “USE THERMALLY PROTECTED BALLAST FOR TYPE LAMP”.
45. **“X” OR “T” TRACK CONNECTORS** — An “X” or “T” shaped intercept track connector (a) provided with breakaway ground tabs, (b) provided with a connector not prewired, or (c) intended for field rewiring and reconfiguration is marked “WARNING — RISK OF FIRE AND ELECTRICAL SHOCK. THIS PRODUCT REQUIRES PROPER FIELD WIRING AND IS INTENDED TO BE INSTALLED BY A QUALIFIED ELECTRICIAN ONLY.”
46. **VOLTAGE OTHER THAN 120 V** — An incandescent luminaire designed for connection to other than a nominal 120 V supply is marked with its input voltage.
47. **TRANSFORMER VOLTAGE** — A luminaire that employs a device (such as a transformer) that is designed to operate only at a specified voltage is marked with its input voltage.
48. **A.C. ONLY** — A luminaire that employs a device (such as a transformer) for use only in an alternating-current circuit is marked “___ VOLTS ___ HERTZ” or “___ V ___ HZ” or “AC ONLY.”
49. **BRANCH CIRCUIT GREATER THAN 20 A** — A recessed luminaire intended to be connected to a branch circuit in excess of 20 amperes is marked “CONNECT TO A BRANCH CIRCUIT SUPPLY RATED ___ AMPS MAX” where the indicated ratings are 30 or 40.
50. **LINE VOLT-AMPERES** — Instead of the current in amperes, a fluorescent luminaire employing a high power-factor, reactor-type ballast or ballasts for bi-pin lamps (preheat or rapid start types) may be marked “FOR LINE VOLT-AMPERES, MULTIPLY TOTAL LAMP WATTAGE BY 1.5.” Similarly, a fluorescent luminaire employing a low-power-factor, reactor-type ballast or ballasts for bi-pin lamps may be marked “FOR LINE VOLTAMPERES, MULTIPLY TOTAL LAMP WATTAGE BY 2.5.” Instead of the current in amperes, a fluorescent luminaire employing single-pin lamps (instant start type) and a high-power-factor ballast or ballasts may be marked “FOR LINE VOLT-AMPERES, MULTIPLY THE TOTAL LENGTH OF ALL LAMPS IN INCHES BY ...” The multiplying factor may be “0.6,” “0.8,” “1.2” or “1.5.”

- 51. GROUND ID** — A luminaire and track system feed connector having a pressure wire terminal for the connection of an equipment ground conductor is marked, adjacent to the terminal or screw, “G”, “GR”, “GRD,” “GND, “GRND”, “GROUND”, or with the grounding symbol. A wire binding screw used to connect an equipment ground conductor is colored green or provided with a grounding abbreviation adjacent to the screw.
- 52. AIR HANDLING GROUNDING** — Recessed luminaires intended for installation only in environmental air handling spaces other than ducts or plenums that rely on a conductive connection to a metal-enclosed wiring system for equipment grounding are marked “INSTALL ONLY IN ENVIRONMENTAL AIR HANDLING SPACES WHERE A COMPLETE METAL ENCLOSED WIRING SYSTEM IS PROVIDED.”
- 53. NEUTRAL ID** — A luminaire and track system feed connector having a terminal for the connection of the neutral supply conductor is marked, adjacent to the terminal or screw, “N”, “NEUTRAL”, “W” or “WHITE”, or is colored white.
- 54. POLARIZED PLUG** — A luminaire with cord and a polarized attachment plug is marked “TO PREVENT ELECTRIC SHOCK, MATCH WIDE BLADE OF PLUG TO WIDE SLOT.”

RECESSED LUMINAIRE MARKINGS

- 55. CLEARANCE AND INSTALLATION** — Recessed luminaires may be installed in insulated or uninsulated ceilings (or walls when marked for wall mounting) depending on their type of Listing as follows:
- a. Suitable for Installation in Direct Contact with Insulation** — These luminaires are marked “TYPE IC,” or “INHERENTLY PROTECTED,” and may be installed where thermal insulation is placed in direct contact with the sides and top of the luminaire. They are protected against overheating by either thermal protection (See Note 58), or are inherently protected (See Note 59).
 - b. Suitable for Installation Only in Poured Concrete** — These luminaires are restricted to use only in a fire resistant medium such as concrete, and are marked “FOR USE IN CONCRETE ONLY.” An in-ground recessed luminaire may alternately be marked “SUITABLE FOR GROUND MOUNTED RECESSED ONLY”.
 - c. Luminaires Requiring Minimum Spacing from Thermal Insulation and Combustibles (Type Non-IC)** — luminaires that are NOT marked “TYPE IC,” “INHERENTLY PROTECTED,” are referred to as Type Non-IC Recessed luminaires. The luminaires are intended to be installed where minimum spacings are maintained between the luminaire and combustibles, side walls, and overhead building members, and may be identified by the spacing-to-thermal insulation marking as specified in Note 63. There are different purposes for the spacings. The minimum spacing to combustibles reduces the risk of the luminaire heat igniting combustibles. This spacing is always a minimum of ½ inch, unless the luminaire is marked: “INSTALL WITH MINIMUM SPACINGS BETWEEN (a) CENTER-TO-CENTER OF ADJACENT LUMINAIRES: ____ mm (____ in.); (b) TOP OF LUMINAIRE-TO-OVERHEAD BUILDING MEMBER: ____ mm (in); and (c) LUMINAIRE CENTER-TO-SIDE BUILDING MEMBER: ____ mm (in.). “ The blank spaces will be replaced by the minimum distances required.

- d. **Suitable for Installation Only in Environmental Air Handling Spaces** — These luminaires are restricted for use only in an environmental air handling space and are marked “INSTALL ONLY IN ENVIRONMENTAL AIR HANDLING SPACES WHERE A COMPLETE METAL ENCLOSED WIRING SYSTEM IS PROVIDED.”
56. **TYPE NON-IC** — Recessed luminaires that are NOT suitable for installation in direct contact with combustible materials or thermal insulation, including insulation installed over the top of the luminaire that entraps heat (Type Non-IC) are marked “DO NOT INSTALL INSULATION WITHIN 76 mm (3 in) OF ANY PART OF THE LUMINAIRE.”
57. **TYPE IC** — A luminaire marked “TYPE IC” may be installed where insulation and combustible materials are placed in direct contact with the sides and the top of the luminaire.
58. **LIGHT BLINKING, THERMAL PROTECTION** — Recessed luminaires provided with thermal protection to sense overheating conditions are marked “BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING” to alert the user of a potential overheating condition.
59. **INHERENTLY PROTECTED** — luminaires that are intended for installation in direct contact with thermal insulation and combustible material, and are designed so that overheating conditions cannot be caused by overlamping or mislamping, are not thermally protected and are marked “INHERENTLY PROTECTED.”
60. **TRIM CORRELATION** — A recessed luminaire is marked “USE WITH (manufacturer’s name) (catalog number) TRIMS ONLY.” The trims are marked with the trim manufacturer’s name and catalog number.
61. **CONVERTIBLE INCANDESCENT RECESSED LUMINAIRE (TYPE IC/NON-TYPE IC)** — Convertible recessed incandescent luminaires can be installed in either insulated (Type IC) or non-insulated (noninsulated Type IC) applications. The Same luminaire housing (rough-in section) is used for both Type IC and Non-Type IC applications. The trim (finishing section) and light source determine the Type IC or Non-IC application of the luminaire. Convertible luminaires have been evaluated with respect to risk of fire by performance testing under conditions of misapplication of lamps or trims. Installation instructions are provided that tell the installer to remove the marking relating to spacing to thermal installation when the luminaire is installed as intended as a Type IC luminaire in an insulated ceiling application. (See note 34).
62. **CONVERTIBLE (TYPE NON-IC/IC) TRIM IDENTIFICATION** — The trim (finishing section) for a convertible recessed incandescent luminaire is provided with correlation markings which identify the trim/ luminaire (finishing/rough-in section) combinations that are suitable for either Type IC or Non-Type IC installation.
63. **ROUGH-IN AND FINISHING SECTIONS** — Some recessed luminaires are intended to be installed in two parts. The Rough-In Section usually consists of the plaster frame and junction box, and is marked “ROUGH-IN SECTION FOR USE WITH FINISHING SECTION _____”, or “ROUGH-IN SECTION _____ FOR CONVERTIBLE RECESSED LUMINAIRE.” The blanks are replaced by catalog numbers or series designations. The Finishing Section usually consists of the recessed housing and trim; it is marked with the manufacturer’s identification and catalogue number. A convertible recessed luminaire trim/finishing section is also marked “FINISHING-SECTION FOR USE WITH ROUGH-IN SECTION _____.” The blanks are replaced by the catalog number or series designations. If a light diffuser is not

provided, an additional marking on the finishing section indicates that the luminaire must not be used with a light diffuser.

- 64. RECESSED TRACK FOR RECESSED LUMINAIRE ASSEMBLIES** — A recessed track channel for recessed luminaire assemblies and intended for installation in a wall or ceiling cavity where thermal insulation is spaced at least 3 inches away from the recessed channel is marked “WARNING — RISK OF FIRE. DO NOT INSTALL INSULATION WITHIN 3 INCHES OF RECESSED CHANNEL IN SUCH A MANNER TO ENTRAP HEAT” or equivalent. In addition, a recessed track channel for recessed luminaire assemblies is marked “NOTICE — THERMALLY PROTECTED TRACK (OR LUMINAIRES). BLINKING LIGHTING MAY INDICATE INSULATION TOO CLOSE TO TRACK (OR OTHER CONDITION CAUSING OVERHEATING)”.
- 65. RECESSED LUMINAIRE ASSEMBLIES** — A recessed luminaire assembly intended for use with a recessed track system is marked with its minimum spacing to adjacent assemblies.

USER MARKINGS

- 66. LAMP REPLACEMENT MARKINGS** — Incandescent and HID type luminaires and track lighting luminaire assemblies are required to be marked with lamp replacement markings. This marking may be used in combination with the trim correlation marking in recessed luminaires (See Note 72). Generally, most fluorescent luminaires are not provided with lamp replacement markings (See Note 67 for compact fluorescent lamps). The lamp replacement marking for incandescent luminaires will state, “CAUTION - RISK OF FIRE. MAX ___ W(ATTS) TYPE ___”, where the blanks are filled in with lamp type and wattage, and may include the word “SHIELDED” if intended for use with a tungsten-halogen lamp which has an integral shield. HID-type luminaires are provided with a lamp replacement marking identifying the replacement lamp wattage and ANSI designation.
- 67. COMPACT FLUORESCENT LAMPS** — luminaires that employ a compact fluorescent lamp with a ballast that is not Class P are marked with the following or equivalent: “USE ONLY ___ TYPE _____ WATT LAMPS. “
- 68. HID LAMP WITH NO ANSI DESIGNATION** — An HID luminaire with a ballast designed to operate a lamp that does not have an ANSI designation is marked “USE MAX ___ WATTS TYPE _____ ONLY” and, if applicable, “USE _____ VOLT LAMPS.”
- 69. DOUBLE-ENDED LAMPS** — A luminaire that employs a double-ended tungsten halogen or HID lamp without an interlock switch is marked “CAUTION — RISK OF SHOCK. DISCONNECT POWER BEFORE SERVICING.” In addition, if the end contact may be energized and accessible during removal of the lamp, the luminaire is additionally marked “CAUTION — RISK OF ELECTRIC SHOCK. INSERT LAMP IN THIS LAMPHOLDER FIRST,” unless provided with an interlock switch. A track lighting luminaire is marked “NOT FOR USE IN DWELLINGS” and “CAUTION — RISK OF ELECTRIC SHOCK. REMOVE FROM TRACK BEFORE RELAMPING.”

- 70. TUNGSTEN HALOGEN LAMPS** — An incandescent luminaire with a tungsten halogen lamp and that does not have a lamp containment barrier is marked “CAUTION — RISK OF FIRE. MAX ___ WATTS TYPE ___ SHIELDED” or “CAUTION – RISK OF FIRE. MAX ___ WATTS TYPE ___ USE LAMP MARKED “SUITABLE FOR IS IN OPEN LUMINAIRES”.
- 71. METAL HALIDE LAMPS** — HID luminaires with Metal Halide (MH) lamps may be provided with a marking if the lamp enclosure is either: not provided or is inadequate for containing lamp particles. The marking is “CAUTION — RISK OF FIRE. DO NOT INSTALL A LAMP IDENTIFIED FOR USE ONLY IN ENCLOSED LUMINAIRES.” A luminaire with a lamp containment barrier that is removed during user maintenance is marked “KEEP PROTECTIVE BARRIER IN PLACE.” A luminaire with a UV attenuation barrier that is removed during user maintenance is marked “CAUTION – RISK OF PERSONAL INJURY. UV LIGHT SOURCE KEEP PROTECTIVE BARRIER IN PLACE”.
- 72. RECESSED LUMINAIRE LAMP REPLACEMENT MARKINGS** — Recessed luminaire housing or rough-in section may employ a marking system where the lamp replacement marking is dependent upon the trim or finishing section used. A luminaire housing is marked “USE ONLY WITH [Manufacturer] [Catalog Number] TRIMS”. A rough-in section is marked “ROUGH-IN SECTION FOR USE WITH FINISHING SECTION _____”. The blanks are filled in with manufacturer and trim or finishing section number as appropriate. All recessed luminaires are marked for lamp replacement “CAUTION – RISK OF FIRE. MAX ___ WATTS ___ TYPE”. A recessed luminaire that requires a different lamp wattage or type for an alternate trim or finishing section is marked “CAUTION – RISK OF FIRE” and a table specifying the trim or finishing section and the maximum lamp wattage and type permitted for use with it. Alternately the lamp replacement information can be included on the trim or finishing section. The lamp replacement markings can be concealed providing the trim or finishing section must be removed for relamping or it is additionally marked where visible during relamping “SEE OTHER (BACK) SIDE FOR RELAMPING INFORMATION.”
- 73. CLASSIFIED TRIMS** — A trim intended for field installation in specified incandescent recessed luminaires is provided with a lamp replacement marking (See Note 72) and identifies the luminaire for which the trim is suitable.
- 74. ADJACENT COMBUSTIBLES** — A track lighting luminaire assembly that produces a temperature greater than 90°C (194°F) on any exterior surface is marked “CAUTION — HOT SURFACE. KEEP AWAY FROM CURTAINS AND OTHER COMBUSTIBLES.”
- 75. PHOTOELECTRIC-CONTROLLED SWITCH** — A luminaire with a single-pole photoelectric controlled switch that is designed for connection to a line-to-line branch circuit is marked “CAUTION — RISK OF ELECTRIC SHOCK. DISCONNECT POWER BEFORE SERVICING.”
- 76. CONVENIENCE RECEPTACLE** — A luminaire provided with a convenience receptacle is marked “MAX__ W(ATTTS)” or “MAX ___ A(MPS)” for its maximum load rating.
- 77. FUSEHOLDER** — A luminaire provided with a fuseholder is marked “MAX ___ A(MPS) with its fuse replacement rating.



Marking and Application Guide

MOLDED CASE CIRCUIT BREAKERS

JANUARY 2013

PREFACE

UL has developed the Molded-Case Circuit Breaker (MCCB) Marking Guide for electrical inspectors, electric utilities, contractors, installers, users, designers, and other interested parties to aid in understanding MCCBs and the applicable codes and standards in order to facilitate a reasonably safe and code-compliant installation of MCCBs. These circuit breakers are intended to be installed in accordance with the *National Electrical Code*® (*NEC*®) and their listing. These markings are required by UL 489, and are part of the listing.

The products covered by this Guide are:

Circuit Breaker Adapters	Circuit Breaker and Surge-protective Devices
Circuit Breaker Accessories	Circuit Breakers for use in Communications Equipment
High Fault Protectors	Combination Type Arc-Fault Circuit Interrupters
High Fault Modules	Branch Feeder Type Arc-Fault Circuit Interrupters
Molded-Case Circuit Breakers	Circuit Breakers with Equipment Ground Fault Protection
Fused Circuit Breakers	Circuit Breaker and Ground Fault Circuit Interrupters
Circuit Protectors	Circuit Breakers for use in Photovoltaic Systems

Complete information regarding the provision of markings and instructions for these circuit breakers is contained in the *Standard for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures*, UL 489. References to the *National Electrical Code*® (*NEC*®) are to the 2011 edition.

Revisions to the 2008 edition of the NEC resulted in panelboards no longer being classified as “Lighting and Appliance Branch-Circuit Panelboards” and “Power Panelboards”, and the 2008 NEC no longer limits the number of overcurrent devices in a lighting and appliance branch-circuit panelboard to 42 circuits. Requirements in UL 489 permit manufacturers to identify “Class CTL” circuit breakers as those with a physical means to prevent the installation of more than 42 circuit breakers into a Class CTL panelboard (or if fewer than 42, that number for which the panelboard was designed and rated). Since existing optional requirements and legacy products continue to be utilized based on NEC requirements that were part of the 2005 and earlier editions, multiple references in this marking guide identify the earlier edition of the NEC as being the relevant NEC requirement.

UL Marking and Application Guides are updated as necessary due to new product development, changes in the codes, or the need for clarification. To confirm the current status of any UL Marking Guide, please consult the Code Authorities page of the UL Web Site at; www.ul.com/codeauthorities.



Your comments or suggestions are welcome and appreciated. They should be sent to:
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INTRODUCTION

USE OF THIS GUIDE

This guide is intended to assist regulatory authorities, designers, and installers in determining the suitability of specific molded case circuit breakers in a particular installation and use, and to address concerns related to fire and shock hazards.

Products are Listed or Classified by UL under an appropriate product category. A four-letter code (shown in parenthesis) following every category title in this guide is the UL product category code designation. A list of molded case circuit breaker product categories evaluated by UL can be found in Appendix A.

Each UL product category code provides a direct link to the Guide Information for the product category. The Guide Information includes the scope of the products covered, information relating to limitations or special conditions applying to the product, the requirements used for the investigation of the products, installation and use information, and information on product markings and the UL Mark to be used on the product. Guide information is available in the UL White Book and online at www.ul.com/database.

The product markings identified in this guide do not include every possible marking that could be provided either on a product or in its installation or operation instructions. The purpose of these markings is to provide you with an indication of the type of text and location of markings that address features that may be critical in determining if a product is certified and / or if it is installed correctly. Refer to the specific Guide Information for the product category for additional marking information.

Additional information can be found at www.ul.com.

INFORMATION ON LISTING VERSUS CLASSIFICATION

Most codes and regulations require the certification of this equipment to applicable safety-related standards. They also may require this equipment to be certified to energy performance standards as well. Products that are certified to safety-related standards have been evaluated with regard to all reasonably foreseeable safety-related hazards, including fire, electrical shock and mechanical hazards. Such products are termed “UL Certified” or “UL Listed.” Products that are certified to a limited range of hazards, or for use under specific conditions are termed “UL Classified”.

It is important to distinguish the difference between “UL Certified” or “UL Listed” and “UL Classified” and the relation these terms have with the term “listed,” as used in various codes. The term “listed” in the codes generally indicates that the product is required to be evaluated in accordance with the appropriate standard(s) by an independent third party certification organization such as UL. The term “listed” in the codes should not be confused with the term “UL Listed,” as explained above. It is important to recognize that not all certification agencies make this distinction in their certification services.

INFORMATION ON UL MARKS

There are several types of UL Marks that can be found on molded case circuit breakers. General information on each of these Marks is provided below. Each has its own specific meaning and significance. The only way to determine if a product has been certified by UL is to look for the UL Mark on the product itself.

The UL Mark on a product means that UL has tested and evaluated representative samples of that product and determined that they meet the requirements in the applicable standard(s). Under a variety of UL programs, certified products are periodically checked by UL at the manufacturing facility to determine that they continue to comply with the standard(s).

The UL Marks may only be used on, or in connection with products certified by UL, and under the terms of a written agreement between the manufacturer and UL.

UL Listing Mark

This is one of the most common UL Marks. If a product carries this Mark, it means UL found that representative samples of this product met UL's *safety* requirements. These requirements are primarily based on UL's own published Standards for Safety, or other recognized third party standards. The UL Listed Mark includes the UL symbol, the word "Listed," the product or category name, and a control number assigned by UL.





UL Classification Mark

This Mark appears on representative samples of products that UL has evaluated but only with respect to specific properties, a limited range of hazards, or suitability for use under limited or special conditions. The UL Classified Mark includes the UL symbol, the word "Classified," a statement of the scope of evaluation, the product or category name, and a control number assigned by UL.



GENERAL

- 1. Type Designation**—All circuit breakers are marked with their type designation. Normally, this marking also includes a catalog number, because most often the location of additional suffix letters and/or numbers in the catalog number provides additional information on ratings. If the full catalog number is marked, the type designation marking is optional.
- 2. Manufacturer's Name** — All circuit breakers are marked with a name, trademark or other recognized means for identifying the organization responsible for the device. Usually, this is the manufacturer—for other references, the marking guide indicates the manufacturer's name.
- 3. Voltage Rating** — All circuit breakers are marked with a voltage rating, including: 60, 125, 125/250, 160, 250, 500 and 600 volts for dc; and 120, 127, 120/240, 240, 277, 347, 480Y/277, 480, 600Y/347 and 600 volts for ac. All circuit breakers are marked with the symbols  for AC,  for DC, or both, as applicable. For ac voltage ratings other than 60 Hz, the frequency is marked. Additional wording may be provided.

Circuit breakers for use in Communications Equipment may also carry ratings of 30, 65 or 80 Volts dc.

Two-pole independent-trip breakers and single-pole breakers with handle ties that are rated 120/240 V ac have been investigated for use in line-to-line single-phase circuits or line-to-line branch circuits connected to 3-phase, 4-wire systems, provided the systems have a grounded neutral and the voltage to ground does not exceed 120 V.

Two-pole independent-trip breakers and single-pole breakers with handle ties that are rated 125/250 V dc have been investigated for use in line-to-line connected 3-wire dc circuits supplied from a system with a grounded neutral, where the voltage to ground does not exceed 125 V.

Two-pole independent-trip breakers and single-pole breakers with handle ties that are rated 125/250 V (both ac and dc) have been investigated for use in accordance with either of the above two paragraphs, as applicable.

Two- and three-pole common-trip breakers rated 120/240V ac are intended for use on 1-phase, 3-wire circuits, where the voltage to ground does not exceed 120 V.

Two- and three-pole common-trip breakers rated 125/250 V or 125/250 V dc are intended for use on 1-phase and dc, 3-wire circuits, where the voltage to ground does not exceed 125 V.

Circuit breakers with a single voltage rating are intended for use in circuits where the circuit voltage and the voltage to ground do not exceed the voltage rating of the breaker.

“Slant (or slash)-rated” breakers with a rating such as 480Y/277 V are intended for use in circuits where the circuit voltage does not exceed the higher of the two voltages and the voltage to ground does not exceed the lower of the two voltages.

Based on the preceding paragraphs, “slant-rated” breakers (120/240, 208Y/120 V, etc., as opposed to 240, 480 V, etc.) are not intended for use on “slant-rated” delta systems. For example, a 3-pole, 120/240 V breaker is not intended for use on a 240/120 V, 3-phase, 4-wire, delta system, because on the high leg, the voltage to neutral is 208 V. In this instance, a 3-pole, 240 V breaker should be used.

4. Ampere Rating — All circuit breakers are marked with a current rating. For breakers rated 100 A or less, this marking is required to be on the handle or the escutcheon area of the breaker. If the marking is placed on the handle of the breaker, the numerical value alone is adequate.

5. Line and Load Identification — A circuit breaker may or may not be marked “Line” and “Load.” If it does not have this marking, it is acceptable for reverse connection. A breaker with interchangeable trip units is marked “Line” and “Load,” unless there is no risk of electric shock when changing the trip unit.

POSITION INDICATION

6. On and Off (Open and Closed) — All circuit breakers are marked to indicate whether they are open or closed. This marking is visible without removing the trim or cover. However, if the breaker is enclosed, it may be necessary to open a hinged cover or door.

7. Trip and Reset — If a circuit breaker handle takes an intermediate position when tripped, the breaker is marked to indicate it is tripped. Instructions for resetting the breaker are also required to be marked. These markings are optional if they already appear on the receiving device, for example the panelboard.

8. Electrical Operation (On and Off) — If the “On” and “Off” markings are not readily visible when an electrical operator is installed, the markings appear on the electrical operator.

9. Electrical Operation (Trip and Reset) — The electrical operator may also indicate the “Tripped” position of the circuit breaker.

INTERCHANGEABLE TRIP UNITS

10. Manufacturer’s Name — All interchangeable trip units are marked with the manufacturer’s name, trademark or other recognized means for identifying the manufacturer.

11. Ampere Rating — All interchangeable trip units are marked with their ampere rating. The numerical value alone is sufficient, if the word “amperes” or an appropriate abbreviation appears on the cover next to the trip unit.

12. Frame Designation — All interchangeable trip units are marked with the frames for which they are intended, unless the instructions provided with the trip units instruct the user on the proper use of the trip units.

13. Magnetic Settings — All interchangeable trip units are marked with the minimum and maximum settings for the adjustable magnetic tripping values.

INTERRUPTING RATINGS

14. Ratings — All circuit breakers with an interrupting rating other than 5000 A are marked with their interrupting rating. If the breaker is not marked with an interrupting rating, the interrupting rating for the breaker is 5000 A. The marking includes the words “Interrupting Rating” or “Current Interrupting Rating” and may include “Maximum RMS Symmetrical,” or an abbreviation. If the interrupting rating includes more than one current and associated voltage rating, all values of voltage and corresponding interrupting rating are marked. If more than one interrupting rating is marked, all ratings appear together. No asymmetrical voltage rating may be marked on the breaker. If the marked interrupting rating of the breaker exceeds the marked short circuit rating of the end-use equipment, such as a panelboard, in which the breaker is installed, the interrupting rating of the overall combination is still considered to be the lesser rating marked on the end-use equipment.

TERMINATIONS

15. Cu-Al Wire — All circuit breakers are marked to identify the type of wire for which they are suitable. The marking includes the words “Copper” and/or “Aluminum” or an abbreviation. If the breaker is intended for use with a copper wire only or an aluminum wire only, the marking includes the word “Only.” A breaker intended for use with No. 10-14 AWG solid wire only is marked “No. 10-14 AWG Solid,” or an equivalent wording.

16. Small Size Wire — Circuit breakers rated less than 15A that have been found acceptable for use with 16 or 18 AWG , rated 10A and 7A respectively are so marked. This marking may be included in the marked wire range.

17. Tightening Torque — All circuit breakers are marked with their rated tightening torque for all terminals intended for field wiring. This is a nominal value. If the torque is dependent on wire size, the marking indicates the range of tightening torques for each wire size.

18. Maximum Wire Size — If the terminals of a circuit breaker will not accept the next larger wire size than required for the breaker rating, the breaker or the terminal is marked to indicate the maximum wire size.

19. Multiple Conductor Connectors — If the terminals of a circuit breaker are acceptable for use with multiple connections in one hole, and the breaker is intended for this type of use, the breaker is marked to indicate the proper multiple connections. This is uncommon for breakers—ordinarily, the terminals are suitable for only one wire per hole.

20. 60/75°C Wire — All circuit breakers rated 125 A or less are marked for use with 60° C, 60/75°C or 75°C only wire. This marking indicates the proper wire size for termination in accordance with Table 310.15(B)(16) of the NEC [®]. It is acceptable to use wire with a higher insulation rating if the ampacity is based on the wire temperature rating marked on the breaker. For breakers rated more than 125 A, the proper wire temperature rating is 75°C and it is optional for the breaker to bear this marking.

21. Separately Shipped Connectors — If the wire connectors are not provided with the circuit breaker when shipped from the manufacturer, the breaker is marked to indicate the proper connectors or connector terminal kit for the breaker. The terminal kit indicates the manufacturer’s name or trademark and proper wire size.

22. Cable Connection Only — A circuit breaker rated more than 4000 A and intended for cable connections only is marked accordingly.

23. Bus Bar Sizes — A circuit breaker intended for use with bus bars other than 1000 A/in.² is marked to indicate the minimum size bus bar to which it should be connected. If not marked, the proper bus bar sizes for termination are based on the table shown below:

Circuit Breaker Frame Size, A	Bus Bars per Terminal	
	Number	Size, in.
1600	2	1/4 X 3
2000	2	1/4 X 4
2500	2	1/4 X 5
	or 4	1/4 X 2-1/2
3000	4	1/4 X 4
4000	4	1/4 X 5
5000	6	1/4 X 5
6000	6	1/4 X 6

ADJUSTABLE TRIP

24. Instantaneous Trip — All circuit breakers with an adjustable instantaneous tripping means are marked to indicate at least the minimum and maximum trip settings. This marking can either be in amperes or a percentage of the breaker's ampere rating. If it is an interchangeable trip unit, the marking may be on the trip unit.

25. Type A and Type B — A Type A adjustable circuit breaker can be repeatedly field adjusted for all changeable characteristics. A Type B adjustable circuit breaker — once set to a particular continuous current rating — cannot be adjusted to a higher value. The Type A breaker is marked with a single ampere rating and percentage, or similar markings, or with current markings for each continuous current adjustment setting. The Type B breaker can be marked with the ampere rating to which it is set. The ampere marking is to be applied by the installer at the time the breaker is set. The notations —Type A and Type B—are not required to be marked on the breaker. They are designations used to determine how to evaluate the breakers.

26. Adjustable Controls — Each control of an adjustable circuit breaker is marked to indicate its function and setting points.

SPECIAL MARKINGS

27. Non-Conducting Enclosure — A circuit breaker not intended for use in a metal enclosure is marked "Suitable for use in a non-conducting enclosure only."

28. Ventilated Enclosure — A circuit breaker for use in a ventilated enclosure is marked to identify the enclosure or to indicate the proper enclosure size, and location and size of the ventilating openings.

29. 40°C — A thermal-magnetic circuit breaker that is suitable for use in ambients up to 40°C is

marked “40°C.” Circuit breakers with electronic type trip units are not affected by the ambient temperature and are not required to be marked to indicate the suitability. These devices may be used in a 40°C ambient unless marked 25°C.

30. Current Limiting — A circuit breaker that meets UL requirements for current limiting is marked “Current Limiting.” The breaker is also marked with the peak current (I_p) and I^2t let-through and related frequency, or to reference a publication available from the manufacturer with this same information. These let-through current curves indicate the let-through currents versus prospective fault current across the range from the threshold level, where the breaker starts to exhibit current limiting characteristics, to the maximum interrupting rating, with at least one intermediate point also indicated. UL’s definition of a current limiting breaker is one that does not use a fusible element and, when operating within its current limiting range, limits the let-through I^2t to less than the I^2t of a 1/2-cycle wave of the available symmetrical current.

31. Class CTL — Circuit breakers for Class CTL panelboards or assemblies are marked “Class CTL” or “CTL.” A Class CTL breaker, because of its size or configuration in conjunction with the physical means provided in Class CTL panelboards, prevents more circuit breaker poles from being installed than the number for which the assembly is designed and rated. A Class CTL panelboard is a circuit limited panelboard. Both “half-sized” and “full-sized” breakers may be marked “Class CTL.” When properly installed, Class CTL circuit breakers will comply with the Lighting and Appliance Branch-Circuit Panelboard requirements in previous editions of the National Electrical Code.

32. “Delta” — A delta breaker is a 3-pole — 3-phase circuit breaker intended to have two poles connected to a bus structure and a third pole isolated, and is marked “For Replacement Use Only.”

33. 2-Pole — 3-Phase Rated — A 2-pole circuit breaker marked “1-Phase — 3-Phase” or “1Ø — 3Ø” may be used on 3-phase, corner-grounded delta circuits, or on single-phase circuits.

34. 3-Pole — 1-Phase Rated — 3-pole circuit breakers are suitable for use on 3-phase systems only, unless marked to indicate use on 1-phase systems, such as, “For 1-phase connections, use two outside poles,” or an equivalent statement. A 3-pole breaker may be used in place of a 2-pole breaker on a 3-phase system, such as a 2-pole breaker used in a branch circuit that is actually two legs of a 3-phase system, and is acceptable without the 3-pole breaker being specifically marked.

35. 4-Pole — 3-Phase Rated — 4-pole circuit breakers are suitable for use on 3-phase systems where a switched neutral is required. The fourth pole is provided either without overcurrent protection or with overcurrent protection of 50 or 100 percent of the other poles. The fourth (neutral) pole of a 4-pole circuit breaker is marked “Protection — % In”. The percentage indicated is 0, 50 or 100.

36. Multi-Wire Circuit — A multi-pole circuit breaker intended for use in a multi-wire circuit only is marked with a combination voltage rating only, such as 480Y/277 V ac, provided a 3-pole breaker intended only for use in a single-phase multi-wire circuit includes in its marked voltage rating the term “1-phase” or an equivalent.

37. DC Rated 3-Pole — A 3-pole circuit breaker rated 250 V dc or less is acceptable for use in DC voltage systems, when marked to indicate its DC voltage rating and it is necessary to use two of the poles to control the circuit. Three-pole breakers rated more than 250 V dc are generally intended to be connected with all three poles in series and are marked with a wiring diagram indicating that all three poles should be wired in series.

38. 100 Percent Continuous Rated — Unless otherwise marked for continuous use at 100 percent of its current rating, a circuit breaker is intended for use at no more than 80 percent of its rated current where in normal operation the load will continue for three hours or more. A breaker with a frame size of 250 A or more, or a multi-pole breaker of any current rating greater than 250 V, may be marked to indicate it is suitable for continuous use at 100 percent of its current rating. The marking is “Suitable for continuous operation at 100 percent of rating only if used in a circuit breaker enclosure Type ____ or in a cubicle space _____ by _____ by _____ inches” or an equivalent statement. This type of breaker may also be marked to indicate it is to be used with wire sized for a 75°C conductor with 90°C insulation and used with 90°C wire connectors.

39. “SWD” — A circuit breaker rated 15 or 20 A, 347 V ac or less, may be marked “SWD” and is suitable for switching fluorescent lighting loads on a regular basis.

40. Independent Trip — A 2-pole circuit breaker that does not have an internal common trip feature is marked “Independent Trip” or “No Common Trip.” An external handle tie alone does not qualify as a common trip mechanism — a breaker of this type is marked to indicate it is an independent trip breaker.

41. Special Characteristics — If the proper operation of a circuit breaker depends on a special characteristic, such as polarity or position, the breaker is marked to indicate this characteristic. If this includes a barrier, shield or similar member, the breaker is marked with all the necessary information. If it is necessary to replace a part, such as a barrier or shield, the marking also includes replacement instructions.

42. For Replacement Not CTL — The marking “For replacement use only not CTL assemblies” appears on breakers that do not have means to prevent their installation in Class CTL assemblies. These breakers are intended for replacement in older assemblies still in service, which pre-dates the Class CTL requirements for circuit breakers and panelboards.

43. Special Purpose Not General — Circuit breakers marked “Special purpose not for general use” have special features limiting their suitability to specific applications. Instructions are provided by the manufacturer detailing these applications.

44. “HID” — A circuit breaker rated 50 A maximum, 480 V or less, and intended to switch high intensity discharge (HID) lighting loads on a regular basis is marked “HID.”

45. Remotely Operated Circuit Breaker—A circuit breaker that can be opened remotely, such as by a utility, for purposes of shedding loads. These circuit breakers are marked “Remotely Operated” and are provided with a separate label marked: “Remotely-operated circuit breaker installed in this equipment” with instructions for attaching the label to the equipment.

FUSED CIRCUIT BREAKERS

46. Line and Load Identification — All fused circuit breakers are marked “Line” and “Load.” The “Load” marking is on the same side of the contacts as the fuses or high-fault protectors.

47. Identification of Fuses — All fused circuit breakers are marked to indicate the fuses or high-fault protectors with which they are to be used.

48. No Open Fuse Tripping — Any fused circuit breaker that does not trip automatically on clearing of one or more of the fuses or high-fault protectors is marked “Open Fuse Tripping Not Provided,” or an equivalent statement.

49. General Markings — These circuit breakers are marked as outlined for all breakers. See Items 1-4, 6-7, 14-23, 29-36, 39-42, 45-46 and 72-75.

CIRCUIT BREAKER/GROUND FAULT CIRCUIT INTERRUPTER

50. “Test” Function — The “Test” switch on a circuit breaker and ground fault circuit interrupter (CB/ GFCI) is marked to identify its purpose. When the test switch is depressed, a current simulating a ground fault is caused to flow and this should cause the internal mechanism to function to trip the breaker.

51. “Class A” Marking — All CB/GFCIs are marked “Class A,” indicating that the CB/GFCI has a ground fault trip threshold of 6mA maximum.

52. Instructions — All CB/GFCIs are provided with: instructions for the installer and user, including instructions on the proper use of the supervisory (test) circuit; and the need to test the device at least once a month. Also included in a marking on the CB/GFCI, or in literature supplied with the CB/GFCI, is information indicating that the user is not protected if contact is made with more than one circuit conductor.

53. Terminal Identification — At least three of the four terminals of a single-pole CB/GFCI and all but one of the terminals of a multi-pole CB/GFCI are identified. The terminals to the grounded conductor are white or gray; the terminals for the ungrounded conductors are a contrasting color. The color green cannot be used.

54. General Markings — These circuit breakers are also marked as outlined for all breakers. See Items 1-7, 14-20, 29, 31, and 39-42.

CIRCUIT BREAKER/EQUIPMENT GROUND FAULT PROTECTION

55. “Test” Function — The “Test” button on a circuit breaker with equipment ground fault protection (CB/ EGFP) is marked to identify its purpose. When the test button is depressed, a current simulating a ground fault is caused to flow and this should cause the internal mechanism to function to trip the breaker.

56. Trip Level Marking — All CB/EGFPs are marked to indicate the ground fault trip threshold of the device, in milliamperes.

57. Instructions — All CB/EGFPs are provided with instructions for the installer.

58. Terminal Identification — All but one of a CB/EGFPs terminals are identified. The terminals to the grounded conductor are white or gray; the terminals for ungrounded conductors are a contrasting color. The color green cannot be used.

- 59. Use Marking** – A CB/EGFP shall be marked “Equipment Protection Only”
- 60. General Markings** — These circuit breakers are also marked as outlined for all breakers. See Items 1-7, 14-20, 29, 31, 39-42 and 73-76.

CIRCUIT BREAKER SURGE-PROTECTIVE DEVICE

- 61. Types** – These devices are marked Type 1, 2 or 3 which delineates the appropriate installable location within the electrification system.
- 62. Voltage Protection Rating** — These devices are marked with a surge voltage protection rating.
- 63. Maximum Continuous Operating Voltage Rating (MCOV)** – These devices are marked in volts, for Type 1 and 2 SPDs at both line-to-line and line-to-neutral.
- 64. Nominal Discharge Current (In) Rating** - in amps or kA for Type 1 and 2 SPDs.
- 65. Short-circuit Current Rating (SCCR)** - in amps or kA for Type 1 and 2 SPDs.
- 66. General Markings** — These circuit breakers are also marked as outlined for all circuit breakers. See Items 1-7, 14-21, 29, 31, 39-42, and 43.

HIGH-FAULT PROTECTORS AND ACCESSORY HIGH-FAULT MODULES

- 67. Type Designation** - All high-fault protectors and modules are marked with their type designation.
- 68. Manufacturer’s Name** - All high-fault protectors and modules are marked with the manufacturer’s name, trademark, or other recognized means for identifying the manufacturer.
- 69. Terminations** - All high-fault modules are marked with their wire termination information. See Item 15-22.
- 70. Circuit Breaker** - All high-fault protectors and modules are marked to indicate the circuit breakers with which they are to be used.
- 71. Interrupting Rating** — All high-fault protectors and modules are marked to indicate their interrupting rating for which the protector and/or module and corresponding circuit breaker were investigated. The marking includes the words “Interrupting Rating” or “Current Interrupting Rating” and may include “Maximum RMS Symmetrical,” or an abbreviation. If the interrupting rating includes more than one current and associated voltage rating, all values of voltage and corresponding interrupting rating are marked. If more than one interrupting rating is marked, all ratings appear together.

ACCESSORIES

72. Ratings — All circuit breakers provided with accessories are marked to identify the accessories installed. This includes the accessory type, electrical ratings and proper connections, if the connections are not obvious. The electrical ratings include the voltage rating, and ac or the frequency in Hertz, dc, or both, as appropriate for all accessories. For alarm and auxiliary switches, the marking also includes either an ampere or pilot-duty rating. For shunt trip accessories, over- and under-voltage trip accessories and electrical operators, the marking also includes either an ampere or VA rating.

73. Shunt Trip — A circuit breaker provided with a shunt trip accessory intended for use with ground fault sensing and relaying equipment is marked to indicate the specific equipment with which it is to be used. As an option, it may be marked to indicate the voltage and frequency, or dc, of the tripping circuit; the rated tripping current at rated voltage; and “Suitable for Ground Fault Protection when combined with Class 1 (or manufacturer and catalog number) Ground Fault Sensing and Relaying Equipment,” or an equivalent statement.

74. Separately Shipped — If a circuit breaker and accessory are shipped separately, the accessory is marked to indicate the manufacturer’s name or trademark, catalog number and electrical ratings. Where there is no space for a permanent marking on the accessory, it is marked with some type of identification that references a removable tag or other type of alternate marking. Instructions are furnished with the accessory indicating the specific breakers with which it is to be used. A marking label indicating the installed accessory and its connections is furnished with the accessory, along with instructions indicating that the label should be attached to the breaker when installed. Installation and wiring instructions are also provided unless the proper installation is obvious.

75. External Dropping Resistor — A circuit breaker is marked to indicate when an external dropping resistor is intended to be used between the line terminals of the breaker and the line terminals of an under-voltage trip device. The marking also includes the manufacturer’s name, catalog number and the resistor’s electrical ratings.

CIRCUIT BREAKER ADAPTERS

76. Type Designation — All circuit breaker adapters are marked with their Type designation.

77. Manufacturer’s Name — All circuit breaker adapters are marked with the manufacturer’s name, trademark or other recognized means for identifying the manufacturer.

78. Terminations — All circuit breaker adapters are marked with their wire termination information. See Items 15-22.

79. Circuit Breaker — All circuit breaker adapters are marked to indicate the breakers with which they are to be used.

80. Instructions — All circuit breaker adapters are provided with installation instructions to guide the installer. A marking label indicating the adapter that has been installed is also furnished, along with instructions that the label should be attached to the breaker when installed.

CIRCUIT PROTECTORS

Circuit protectors are designed for installation in standard Edison base fuseholders and intended to provide overcurrent protection for services and branch circuits. They are not provided with manual “On” and “Off” switches, but do have a trip-free manual reset to reclose the circuit after automatic opening from overload or short circuit. They are suitable for use on circuits where the available fault current does not exceed 5000 A RMS symmetrical.

- 81. **Manufacturer’s Name** — All circuit protectors are marked with the manufacturer’s name, trademark or other recognized means for identifying the manufacturer.
- 82. **Voltage Rating** — All circuit protectors are marked with a voltage rating.
- 83. **Ampere Rating** — All circuit protectors are marked with a current rating.
- 84. **Reset Instructions** — All circuit protectors are marked with instructions for resetting the protector after it has tripped.

CIRCUIT BREAKERS FOR USE IN COMMUNICATIONS EQUIPMENT

- 85. **Ambient Operating Temperature** — Some circuit breakers for use in communications equipment have been investigated for use in ambient air at temperatures greater than 40°C. These circuit breakers are marked with either the intended operating ambient temperature or a range of temperatures.
- 86. **Wire Insulation Temperature Rating** — Circuit breakers for use in communications equipment that have been investigated for use in ambient temperatures greater than 40°C and that require use with wire having insulation temperature ratings greater than 75°C are marked with the temperature rating of the wire that should be connected to it. The ampacity of the wire should be as specified for 75°C.
- 87. **Same Polarity** — Circuit breakers for use in communications equipment that have accessories are marked “SAME POLARITY” when that is required to maintain spacings between the primary circuit and the accessory circuit.
- 88. **General Markings** — These circuit breakers are also marked as outlined for breakers. See items 1-7, and 14-21.

MOLDED CASE CIRCUIT BREAKERS ALSO LISTED AS COMBINATION TYPE ARC-FAULT CIRCUIT INTERRUPTERS

- 89. **Device Identifier** — These devices are marked with words “Combination Arc-Fault Circuit Interrupter” or “Combination AFCI” where visible with a dead-front removed while the device is installed so that the device will not be mistaken for a circuit breaker and GFCI.
- 90. **“TEST” Function** — The “TEST” switch on an arc-fault circuit interrupter is marked to identify its purpose. When the test switch is depressed, a signal that simulates an arc such that the arc detection circuit or software is caused to detect the simulated arc and this should cause the mechanism to function to trip the breaker.

91. Instructions — Combination Arc-Fault Circuit Interrupters are provided with installation instructions that tell the user the proper method of installing the device.

92. General Markings — These circuit breakers are also marked as outlined for all breakers. See items 1-7, 14-21, 29, 31, and 39-42.

MOLDED CASE CIRCUIT BREAKERS ALSO LISTED AS BRANCH/FEEDER TYPE ARC FAULT CIRCUIT INTERRUPTERS

93. Device Identifier — These devices are marked with words “Branch/Feeder Arc-Fault Circuit Interrupter” or “Branch/Feeder AFCI” where visible with a dead-front removed while the device is installed so that the device will not be mistaken for a circuit breaker and GFCI.

94. “TEST” Function — The “TEST” switch on an arc-fault circuit interrupter is marked to identify its purpose. When the test switch is depressed, a signal that simulates an arc such that the arc detection circuit or software is caused to detect the simulated arc and this should cause the mechanism to function to trip the breaker.

95. Instructions — All arc-fault circuit interrupters are provided with instructions for the installer and user, including wiring instructions, correct operation and test instructions.

96. General Markings — These devices are also marked as outlined for all breakers. See 1-7, 14 -21, 29, 31, and 39-42..

CLASSIFIED MOLDED CASE CIRCUIT BREAKERS FOR USE IN SPECIFIED EQUIPMENT

97. Classified Only and Compatibility List - A circuit breaker that is Classified only is marked on the side with the statement:

"Classified for use only in specified panelboards where the available short-circuit current is 10 kA, 120/240 volts ac or less. Do not use in equipment connected to circuits having an available system short-circuit current in excess of 10 kA, 120/240 volts ac. For catalog numbers (or equivalent) of specified panelboards, refer to Publication No. _____ provided with this circuit breaker. If additional information is necessary, contact [Classified circuit breaker manufacturer's name]."


98. Classified and Listed Compatibility List - A circuit breaker that is both Classified and Listed is marked on the side with the statement:

"This circuit breaker is Listed for use in circuit breaker enclosures and panelboards intended and marked for its use. This circuit breaker is Classified for use, where the available short-circuit current is 10 kA, 120/240 V ac or less, in the compatible panelboards shown in Publication No. _____ provided with this circuit breaker. When used as a Classified circuit breaker, do not use in equipment connected to circuits having an available system short-circuit current in excess of 10 kA, 120/240 V ac. If additional information is necessary, contact [Classified circuit breaker manufacturer's name]."

99. Compatibility List - The referenced publication is a compatibility list which tabulates the company name, catalog number, number of poles and electrical ratings of the Classified circuit

breaker, in addition to the company name and catalog number of the applicable UL Listed panelboards, and corresponding UL Listed circuit breakers in place of which the Classified circuit breaker has been investigated. The compatibility list also details the maximum permissible voltage and maximum available short circuit current of the supply system to the panelboard. The Classified circuit breaker is not suitable for the specified application if the system supply characteristics exceed the maximum values indicated in the compatibility list. One copy of the compatibility list is provided with each circuit breaker.

100. Classification and Listing Mark - Circuit breakers that are both Classified and Listed have markings as above, with the addition of the Listing Mark, located on the side of the circuit breaker.

The following mark:  appears on the front, visible surface of the circuit breaker.

101. General Markings- These circuit breakers are also marked as outlined for all breakers. See items 1-7, 14-21, 39-40, 42-43, 51-66 and 89-96.

MOLDED CASE CIRCUIT BREAKERS FOR USE IN PHOTVOLTAIC (PV) SYSTEMS

102. Voltage Rating - These circuit breakers are marked with a voltage rating up to 1000 V dc maximum

103. PV marking - These circuit breakers or circuit-breaker enclosures are marked "Photovoltaic" (or "PV") and may, in addition, be marked "Suitable for Use in Photovoltaic Systems in Accordance with Article 690 of the NEC," or equivalent.

104. Multi-pole PV Circuit Breakers - A multi-pole PV circuit breaker or PV circuit-breaker enclosure is intended for individual circuits on each pole unless specifically marked with a diagram and/or other verbiage detailing the correct electrical connections.

105. Temperature Rating - PV circuit breakers are marked "50°C."

106. Wire Range and Type - PV circuit breakers are marked with the applicable wire range, wire type, and stranding if different from building wire, temperature rating of the wire, and torque ratings for the pressure-wire terminations. For the wire type, the following abbreviations are used: copper (Cu), solid (sol), stranded (str). A breaker may, instead, be marked with the minimum size bus bar with which it can be used.

107. General - These devices are also marked as outlined for all breakers. See 1-7, 10-15, 17-23, 27, 28, 41, and 45.

LOCATION

General — All circuit breaker markings are assigned a location code indicating where a marking is to be applied on the breaker. The location codes are assigned a letter A through K, with A being the highest order and K the lowest. At the manufacturer's option, a higher order location code may be used for a marking.

Location Codes — The location codes are:

- A. The marking is visible without removing the trim or cover.
- B. The marking is visible without disassembling the device, when the trim or enclosure cover is removed, and may be visible with the trim or cover in place.
- C. The marking may be on any convenient location except the rear of the breaker.
- D. The marking need only be visible after removal of the CB frame cover, or the equivalent.
- E. The “TRIPPED” or “RESET” markings are not required on the breaker if the receiving device is so marked.
- F. For electrically operated breakers, the “ON” and “OFF” markings are not required on the breaker if the electrical operator is so marked.
- G. The “part replacement” marking does not need to be visible when the removable part is installed.
- H. The marking is visible when the wire connector is in place.
- I. The fuse or protector identification is to be visible when the cover over the fuse or protector compartment is removed.
- J. The marking or information may be shipped with the breaker.
- K. For breakers 1-1/2 inches wide per pole or less, the marking may be located at any convenient location except the rear of the breaker.

CIRCUIT BREAKER MARKINGS

The following gives the marking and associated location category.

GENERAL

Type Designation	B
Manufacturer's Name	B
Voltage Rating	B
Ampere Rating (more than 100 A)	B
Ampere Rating (100 A or less)	A
Line and Load Identification	B

POSITION INDICATION

On and Off (Open and Closed)	A
Trip and Reset	B, E
Electrical Operation (On and Off)	B, F
Electrical Operation (Trip and Reset)	B, F

INTERCHANGEABLE TRIP UNIT

Manufacturer's Name	D
Ampere Rating	B
Frame Designation	D
Magnetic Settings	D

INTERRUPTING RATINGS

Ratings	B, K
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APPENDIX A
UL MOLDED CASE CIRCUIT BREAKER PRODUCT CATEGORIES

UL does list these types of devices and continues to develop new product categories to address the safety issues associated with these types of devices. Below is a list of product categories that UL currently lists to address these types of products. Each product category is tabulated with a UL Category Code. By clicking on the code, you will be linked to the UL Guide Information for the category and any Listings or Classifications under that Product Category in the UL Online Certifications Directory database at www.ul.com/database. The table also identifies the sections of this Marking Guide that are applicable.

Category Code	Category Name	Marking Guide Sections
AVZQ	Molded case circuit breakers also Listed as Branch/Feeder type Arc Fault Circuit Interrupters	94-97
AWAH	Molded case circuit breakers also Listed as Combination type Arc Fault Circuit Interrupters	90-93
DHWZ	Circuit Breaker Adapters	77-81
DIHS	Accessories	73-76
DIMV	Circuit Breaker/Surge Protective Device	62-67
DIRW	High-Fault Protectors and High-Fault Modules	68-72
DITT	Circuit Breaker for use in Communications Equipment	86-89
DIUR	Circuit Breakers for use in Photovoltaic Systems	102- 107
DIVQ	Molded Case Circuit Breaker	1-46
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Marking and Application Guide

PANELBOARDS

JANUARY 2013

PREFACE

Panelboards are no longer a simple assembly of switches, fuses and circuit breakers for single ampere and voltage systems. Today, there are panelboards for a variety of electrical supply systems with overcurrent protections for many short-circuit capabilities. This has resulted in a complex marking system.

UL developed the Panelboard Marking Guide for electrical inspectors, electric utilities, contractors, installers, users, designers, and other interested parties to aid in understanding panelboards and the applicable codes and standards in order to facilitate a reasonably safe and code-compliant installation of panelboards used in ordinary locations, rated 600 volts or less. These panelboards are intended to be installed in accordance with the *National Electrical Code*® (NEC®) and their listing. These markings are required by UL 67, and are part of the listing.

The term “panelboard” used in this booklet also applies to modular panelboards unless otherwise noted.

The Table of Contents lists the main headings and their page numbers. The Index gives an alphabetical list of specific items and the section numbers where information about them can be found. Marking guides are available for Deadfront Switchboards and Molded Case Circuit Breakers.

Complete information regarding the provision of markings and instructions for these panelboards is contained in the Standard for Panelboards, UL 67. Unless otherwise noted, references to the *National Electrical Code*® (NEC) are to the 2011 edition.

Revisions to the 2008 edition of the NEC resulted in panelboards no longer being classified as “Lighting and Appliance Branch-Circuit Panelboards” and “Power Panelboards”, and the 2008 NEC no longer limits the number of overcurrent devices in a lighting and appliance branch-circuit panelboard to 42 circuits. Requirements in UL 67 permit manufacturers to identify “Class CTL” panelboards as those with a physical means to prevent the installation of more than 42 overcurrent devices (or if fewer than 42, that number for which the panelboard was designed and rated). Since existing optional requirements and legacy products continue to be utilized based on NEC requirements that were part of the 2005 and earlier editions, multiple references in this marking guide identify the earlier edition of the NEC as being the relevant NEC requirement.

UL Marking and Application Guides are updated as necessary due to new product development, changes in the codes, or the need for clarification. To confirm the current status of any UL Marking Guide, please consult the Code Authorities page of the UL Web Site at <http://www.ul.com/codeauthorities>.



Your comments or suggestions are welcome and appreciated. They should be sent to:

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INTRODUCTION

USE OF THIS GUIDE

This guide is intended to assist regulatory authorities, designers, and installers in determining the suitability of panelboards in a particular installation and use, and to address concerns related to fire, shock, and mechanical hazards.

Products are Listed or Classified by UL under an appropriate product category. A four-letter code (shown in parenthesis) following every category title in this guide is the UL product category code designation.

Each UL product category code provides a direct link to the Guide Information for the product category. The Guide Information includes the scope of the products covered, information relating to limitations or special conditions applying to the product, the requirements used for the investigation of the products, installation and use information, and information on product markings and the UL Mark to be used on the product. Additional information on marking requirements can be found in the guide information for Panelboards (QEUY) and Modular Panelboards (QFOF), which is located in the UL White Book and online at www.ul.com/database.



QEUY



QFOF

The product markings identified in this guide do not include every possible marking that could be provided either on a product or in its installation or operation instructions. The purpose of these markings is to provide you with an indication of the type of text and location of markings that address features that may be critical in determining if a product is certified and / or if it is installed correctly. Refer to the specific Guide Information for the product category for additional marking information.

The numbering for code sections used in this document may change as the specific code is updated.

Additional information can be found at www.ul.com.

INFORMATION ON LISTING VERSUS CLASSIFICATION

Most codes and regulations require the certification of power distribution equipment to applicable safety-related standards. They also may require this equipment to be certified to energy performance standards as well. Products that are certified to safety-related standards have been evaluated with regard to all reasonably foreseeable safety-related hazards, including fire, electrical shock and mechanical hazards. Such products are termed “UL Certified” or “UL Listed.” Products that are certified to a limited range of hazards, or for use under specific conditions are termed “UL Classified.”

It is important to distinguish the difference between “UL Certified” or “UL Listed” and “UL Classified” and the relation these terms have with the term “listed,” as used in various codes. The term “listed” in the codes generally indicates that the product is required to be evaluated in accordance with the appropriate standard(s) by an independent third party certification organization such as UL. The term “listed” in the codes should not be confused with the term “UL Listed,” as explained above. It is important to recognize that not all certification agencies make this distinction in their certification services.

INFORMATION ON UL MARKS

There are several types of UL Marks that can be found on power distribution equipment. General information on each of these Marks is provided below. Each has its own specific meaning and significance. The only way to determine if a product has been certified by UL is to look for the UL Mark on the product itself.

The UL Mark on a product means that UL has tested and evaluated representative samples of that product and determined that they meet the requirements in the applicable standard(s). Under a variety of UL programs, certified products are periodically checked by UL at the manufacturing facility to determine that they continue to comply with the standard(s).

The UL Marks may only be used on, or in connection with products certified by UL, and under the terms of a written agreement between the manufacturer and UL.

UL Listing Mark

This is one of the most common UL Marks. If a product carries this Mark, it means UL found that representative samples of this product met UL’s *safety* requirements. These requirements are primarily based on UL’s own published Standards for Safety, or other recognized third party standards. The UL Listed Mark includes the UL symbol, the word “Listed,” the product or category name, and a control number assigned by UL.



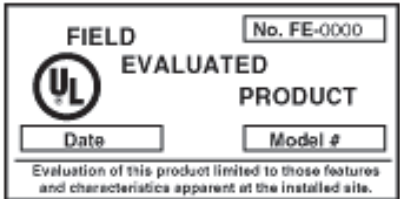
UL Classification Mark

This Mark appears on representative samples of products that UL has evaluated but only with respect to specific properties, a limited range of hazards, or suitability for use under limited or special conditions. The UL Classified Mark includes the UL symbol, the word “Classified,” a statement of the scope of evaluation, the product or category name, and a control number assigned by UL.



FIELD EVALUATIONS

You may encounter situations in which you are unable to determine if a product has been listed by a third-party organization. Or in other situations you might encounter a product bearing a listing label that may have been modified in the field, and now you question whether or not the product still complies with the applicable standard. UL offers a field evaluation service that provides data to assist you in making your decision whether to accept the product and/or approve the installation. Anyone directly involved with a product – including manufacturers, owners, contractors, and regulatory authorities – can request a Field Evaluation. Detailed information for this program can be found on UL’s Web site at www.ul.com/field.



1. GENERAL INFORMATION

The evidence of Listing is the Listing Mark on the product. The Listing Mark for panelboards includes the name and/or symbol of UL, together with the word “Listed,” a control number, and one of the following product names as appropriate: “Panelboard,” “Enclosed Panelboard,” and “Marine, Enclosed Panelboard For Use on Vessels Over 65 Feet.” The product name may include the wording “Class CTL” or “Suitable for Use as Service Equipment” where appropriate. The product name “Enclosed Panelboard” covers both the panel and enclosure with which it is provided.

The product names for modular panelboards are “Panelboard Module” and “Panelboard Accessory Module.”

The basic Standard used to investigate products in these categories is the Standard for Panelboards, UL 67. In addition, each accessory module in a modular panelboard system is investigated in accordance with the applicable UL Standard.

Panelboard markings may be molded, die-stamped, paint-stenciled, stamped, etched in metal that is permanently secured, or printed on a label secured by adhesive and located so that it will not be covered when the units are installed. Some markings may be located on a wiring diagram in a pocket within the panelboard.

2. GLOSSARY

Ampacity - The current in amperes a conductor can carry continuously under the conditions of use without exceeding its temperature rating.

Bonding - The permanent joining of metallic parts to form an electrical conductive path that ensures electrical continuity and the capacity to conduct safely any current likely to be imposed.

Bonding Jumper - A reliable conductor to ensure the required electrical conductivity between metal parts required to be electrically connected.

Bonding Screw - A screw that is used as a bonding jumper.

Cabinet - An enclosure designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.

Cartridge Fuse - A fuse consisting of a current-responsive element inside a fuse body with contacts on both ends.

Circuit Breaker - A device designed to open and close a circuit by nonautomatic means, and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its rating.

Class CTL Panelboard - A panelboard that has physical means to prevent the installation of more than 42 overcurrent devices, or if fewer than 42, that number for which the panelboard was designed and rated. Note - When properly installed, Class CTL panelboards will comply with the

Lighting and Appliance Branch-Circuit Panelboard requirements in previous editions of the National Electrical Code.

Continuous Duty - Operation at a substantially constant load for an indefinitely long time.

Current-Limiting Device (AC) - An overcurrent protective device that, when interrupting currents in its current-limiting range, will reduce the current flowing in the faulted circuit to a magnitude substantially less than that obtainable in the same circuit if the device were replaced with a solid conductor having a comparable impedance.

Current Rating - The designated maximum direct or alternating current in rms A at rated frequency that a device can carry continuously under specified conditions.

Cutout Box - An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the box proper.

Device - A unit of an electrical system that is intended to carry or control, but not utilize, electrical energy.

Enclosed Panelboard - An assembly of buses and connections, overcurrent devices, and control apparatus with or without switches, or other equipment, installed in a suitable cabinet, cutout box, or enclosure suitable for a panelboard application.

Enclosed Recreational Vehicle (RV) Panelboard – An enclosed panelboard intended to be installed in a recreational vehicle (RV) in accordance with Article 551 of the National Electrical Code, ANSI/NFPA 70.

Enclosure - A surrounding case constructed to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection to the enclosed equipment against specified environmental conditions.

Filler Plate – A plate intended to close an opening that would otherwise be closed by the subsequent installation of a circuit breaker or other device.

Flush-Mounted (Type) - A device designed to be set into and secured to a flat surface, with a minimal front projection.

Frame Size - A term applied to a group of molded case circuit breakers of similar physical configuration. Frame size is expressed in amperes and corresponds to the largest ampere rating available in the group. The same frame size designation may be applied to more than one group of circuit breakers.

Fuse - A non-resettable protective device which opens a circuit during specified overcurrent conditions by means of a current responsive element or elements.

Fuse Clips - The contacts of the fuseholder that support the fuse and connect the fuse terminals with the circuit.

Fusible Switch - A switch in which one or more poles have a fuse in series in a composite unit.

Fuseholder - An assembly of a base, fuse clips, and necessary insulation for the mounting and connecting of a fuse into a circuit.

Ground-Fault Protection of Equipment - A system intended to provide protection of equipment from damaging line-to-ground fault currents by operating to cause a disconnecting means to open all ungrounded conductors of the faulted circuit. This protection is provided at current levels less than those required to protect conductors from damage through the operation of a supply circuit overcurrent device.

Grounded Conductor - A system or circuit conductor that is intentionally grounded.

I^2t (Ampere Squared Seconds) - An expression related to the circuit energy as a result of current flow. The " I^2 " stands for the square of the effective (rms) let-through current and the "t" stands for the time of current flow in seconds. " I^2t " is a common expression for the circuit energy between the initiation of the fault current and the clearing of the circuit.

Interrupting Rating - The highest current at rated voltage that a device is intended to interrupt under standard test conditions.

Knockout - A portion of the wall of an enclosure so fashioned that it is capable of being readily removed by a hammer, screw driver, and pliers at the time of installation in order to provide an opening or hole for the attachment of a raceway, cable, or fitting.

Lighting and Appliance Branch Circuit Panelboard - A lighting and appliance branch circuit panelboard is one having more than 10 percent of its overcurrent devices protecting lighting and appliance branch circuits. Such circuits have a connection to the neutral of the panelboard and overcurrent protection of 30 A or less in one or more conductors.

Mains (Main Terminals) - The terminals, or main device, provided for the connection of the main incoming line conductors.

Neutral (Assembly); Solid Neutral - An assembly consisting of enough terminals to provide for the connection of the grounded (neutral) line and load conductors. When used as a component of service equipment, the neutral also includes the following: a) a means for making the required bonding connection between the neutral and the enclosure; and b) a terminal for the grounding electrode conductor.

Neutral Conductor - A conductor that is connected to the midpoint of a three-wire single-phase system, the center point of a wye-connected three-phase system, or the midpoint of one side of a delta-connected three-phase system. Note: The neutral conductor is the grounded conductor.

Overcurrent Protective Device - An individual fuse or circuit breaker pole.

Panelboard - A single panel or a group of panel units designed for assembly in the form of a single panel; includes buses, automatic overcurrent devices, and may be equipped with switches for the

control of light, heat, or power circuits; designed to be placed in a cabinet or cutout box placed in or against a wall or partition and accessible only from the front.

Plug Fuse - A screw-in type fuse for use in an Edison base type fuseholder.

Power Panelboard - A power panelboard is one having 10 percent or fewer of its overcurrent devices protecting lighting and appliance branch circuits.

Pressure Wire Connector - A reusable connector into which the conductor (wire) is secured by mechanical pressure applied by an integral screw, cone, or other mechanical parts.

Pullout Switch - A switch, enclosed or nonenclosed, that is operated to open a circuit by manually separating the movable contact from the stationary contact, and is operated to close a circuit by manually reconnecting the movable contact and the stationary contact.

Recreational (RV) Panelboard – A panelboard installed in a recreational vehicle (RV) in accordance with Article 551 of the NEC.

Service - The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

Service Equipment - The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s), and their accessories, connected to the load end of service conductors to a building or other structure, or an otherwise designated area, and intended to constitute the main control and cutoff of the supply.

Short-Circuit-Current Rating - The maximum rms available current to which a device can be connected. The rating is expressed in amperes and volts.

Switch - A device, manually operated, unless otherwise designated, for opening and closing or for changing the connection of a circuit.

Symmetrical Current - Alternating current having no offset or transient component and, therefore, having a wave form essentially symmetrical about the zero axis. Symmetrical current is expressed in terms of rms A.

3. MANUFACTURER'S IDENTIFICATION

If there is a question on the design or construction of a panelboard, the identification of the organization responsible for the product is important. This is one of the basic markings required by Section 110.21 of the National Electrical Code® (NEC).

For manufacturers who produce panelboards at more than one factory, UL also requires a distinctive marking to identify the factory at which the panelboard was made. This information is generally found on the UL Listing label. It enables the manufacturer to pinpoint problems and take immediate action.

UL requires the manufacturer's identification be visible without disturbing interior parts and factory or field installed wiring. Whether the marking appears on an inside wall of the enclosure or on the side of a barrier, the manufacturer's identification must be located near the front edge of the box or barrier.

4. CATALOG DESIGNATION

Panelboards are marked with a catalog number, a general type designation, or other distinctive marking identifying the particular panelboard construction. Additional designations are provided on modular panelboards.

5. ELECTRICAL RATING

UL requires that the basic electrical rating markings be visible without disturbing wiring or other interior parts. Electrical rating information includes voltage and ampere ratings. For alternating current ratings, the information includes the number of phases, if other than single phase, and the frequency, if other than 50 or 60 hertz.

6. VOLTAGE RATING

The basic voltage rating markings must be visible without disturbing wiring and other interior parts. A panelboard designed and intended for use only on a supply circuit involving two different potentials (for example, 120/240 volts, three-wire; or 208Y/120 volts, three-phase, four-wire) is so marked.

In many cases, however, the basic voltage rating marking — for example, 480 volts, 3-phase — indicates that the panelboard is suitable for various supply systems (such as 208Y/120 volts, 3-phase, 4-wire; 120/ 240 volts, 3-wire; 240/120 volts, 3-phase, 4wire delta, etc.). These voltage ratings may be shown on a wiring diagram affixed to the panelboard or its enclosure.

A single-phase, 3-wire panelboard is not permitted to be marked with a 120/240 volt, 3-phase, 4-wire delta rating. 3-wire panelboards should not be used for this system. The use of a delta breaker to adapt a 3-wire panelboard to the system has been prohibited by Section 408.36(C) of the NEC.

Although delta breakers could be used properly in 3-wire, split-bus panelboards, they were being misused in 3-wire panelboards with a single main disconnect.

Misusing delta breakers in this manner allows voltage to backfeed through the delta breaker load when the panelboard main disconnect is opened. This allows voltage to be present on the main bus bars when none is expected.

7. CURRENT RATING

The current rating of a panelboard is the maximum continuous current that can be supplied through the main terminals.

Unless the assembly, including the overcurrent device(s), are marked for use at 100 percent of their current rating, overcurrent protection devices should not be loaded continuously to more than 80 percent of their rating if nuisance opening of the overcurrent device is to be avoided.

The current rating of a panelboard may be supplemented by one or more reduced ratings, each applicable under specified conditions.

For example, a manufacturer may wish to provide terminals suitable for both copper or aluminum wire but space in the panelboard may not be sufficient for terminals and wire bending space. In this case, the ampere rating is reduced to compensate for the size of aluminum wire that can be used. Sometimes there is a need for a lighting and appliance panelboard with a main circuit breaker to have a current rating less than the normally required rating of the panelboard. In this case, the marked current rating is followed by the words “Maximum — See main circuit breaker rating.” This does not apply to panelboards having a main fused switch. Such panelboards are not provided with fuses when stocked. Lower rated fuses within the same case size, however, can be installed later.

A lighting and appliance panelboard marked as suitable for use as service equipment is limited to two main disconnects. To prevent overloading, the current rating of such panelboards shall equal the combined current ratings of the two disconnects as required by Section 408.36(A) of the NEC (2005 Edition) or Section 408.36, Exception 2 (2011 Edition). Where main disconnects are not provided with the panelboard, the NEC requires that main overcurrent protection be provided in the feeder circuit supplying the panelboard.

If the ampacities of the ungrounded (main) bus bars and the grounded (neutral) bus bars are not identical, the current rating markings of the panelboard are required to show the ampacity of each bus bar.

While it is unusual for the phase bars to be of different ampacities, the neutral can be a reduced size according to Section 220.61 of the NEC.

Because neutrals are often fabricated from connector bars with unusual shapes, in most cases it is not possible to judge ampacity from physical dimensions. UL conducts a temperature test on the assembly to determine ampacity.

If a panelboard employs a snap switch rated 30 amperes or less in any branch circuit, it cannot be rated more than 200 amperes unless there is a supply side overcurrent protection at 200 amperes or less within the panelboard. This requirement assumes that panelboards rated 200 amperes or less will be installed with overcurrent protection in accordance with Section 408.36(A) of the NEC.

Section 408.36(A) of the NEC was adopted years ago when snap switch panelboards were common and short circuit problems were caused by small electrical spacings between live parts and the ground within snap switches. It should be noted that this Section does not apply to snap switches rated over 30 amperes or to switches or circuit breakers that have larger electrical spacings and are suitable for use as service disconnects.

8. SHORT-CIRCUIT CURRENT RATINGS

A panelboard is required to be marked with the phrase “Short-Circuit Current Rating” and the rating in rms symmetrical amperes. This phrase indicates that (1) that the overcurrent devices are capable of opening the circuit under fault conditions; and (2) the panelboard bus structure will withstand the magnetic forces generated by fault current passing through it. These markings are provided to ensure proper installation with respect to Section 110.10 of the NEC.

Also, switches and circuit breakers under switching operations must be capable of closing in on a fault of the magnitude indicated. In addition, they must open satisfactorily on lesser faults of such magnitude that the opening of the overcurrent feature is delayed.

The letters “rms” stand for root-mean-square. This is the value that would be read on an ordinary ammeter. The marked short circuit current rating on the panelboard is the steady-state value of the fault current the panelboard can withstand without extensive damage.

Since the ability of an overcurrent protection device to open on fault currents is affected by the voltage rating of the circuit, a panelboard may have several short-circuit current ratings, each associated with a specific voltage rating.

Panelboards that contain watt-hour meter sockets other than those intended for use with current transformers are additionally marked with the phrase “Watt-hour meter not included in the short-circuit current rating” since the meters are not evaluated during the performance of the short-circuit current test.

Many panelboards are designed to accept various types of circuit breakers or fused switches with different interrupting ratings. Some of these ratings may be less than the panelboard ratings. Panelboards are required to be marked to indicate that the short-circuit current rating is limited to the lowest interrupting capacity of any device installed in the panelboard.

Some panelboards may be marked to indicate one or more short-circuit current ratings which are dependent on the use of specific integral or remote main overcurrent protective devices. An example of such a marking is: “When protected by _____ ampere maximum Class _____ fuse or (Manufacturer’s name and type designation) circuit breaker rated not more than _____ amperes, this panelboard is suitable for use on a circuit capable of delivering not more than _____ rms symmetrical amperes, _____ volts maximum,” or an equivalent statement.

Some panelboards are marked for installation of circuit breakers having a lower interrupting rating than the panelboard short-circuit-current rating. The circuit breakers are acceptable for use above their marked interrupting rating if used on the load side of a specific overcurrent device. In such cases, the panelboard is marked as follows (the blank spaces would be filled with the appropriate information):

1. The short-circuit current rating of this panelboard is equal to the lowest interrupting rating of any installed circuit breaker or fused switch, but not more than _____ rms symmetrical amperes at _____ volts, 3-phase, or _____ rms symmetrical amperes at _____ volts, single-phase; and

2. The interrupting rating of a circuit breaker is 5,000 rms symmetrical amperes and for a fused switch is 10,000 rms symmetrical amperes, or as marked on the device, except for the following series combination ratings:

Load Side Circuit Breakers		Line Side Circuit Breakers	Interrupting Rating
Mfr. Rating	Type Poles Amp	Mfr. Type Amp Rating	Symmet. Amp rms Volts ac Phases
Load Side Circuit Breakers		Line Side Circuit Breakers	Interrupting Rating

A load side circuit breaker may be a branch, sub-main, or an integral main used on the load side of a remote main. A line side circuit breaker or fused switch may be a sub-main, integral main, or a remote main. This series combination interrupting rating shall not exceed that of the line side circuit breaker or fused switch.

There are other markings that identify special conditions when a short-circuit current rating is applicable. These markings must be followed whenever overcurrent devices are added or replaced.

9. SUITABLE FOR USE AS SERVICE EQUIPMENT

These are the basic requirements that a panelboard rated 600 volts or less must meet in order to be used as service equipment:

- A. Service disconnecting means must be provided.
- B. Each service disconnect provided must have a switching feature that disconnects all conductors from the service-entrance conductors and that is suitable for use as a service disconnect. There is one exception: the neutral service conductor can be disconnected by removing the wires from the pressure wire connectors on the service neutral bus as noted in Section 230.75 of the *NEC*.

Disconnects and overcurrent protection which are located on the supply side of the service disconnecting means may be located behind a deadfront or screwed-on cover if:

- (1) The circuit being controlled is installed as part of the Listed panelboard,
- (2) the circuit being controlled is contained within the panelboard enclosure, and
- (3) the panelboard is marked, adjacent to the main disconnect(s) to alert the user that the main(s) does not disconnect control and instrument circuits.

In general, snap, toggle or similar switches, are not acceptable because their internal electrical spacings are too small. The exception in Section 225.36 of the *NEC* for branch circuit switches used to disconnect garages and out buildings on residential property does not apply to the service disconnects in a panelboard.

Circuit breakers, either molded case, fused, or in combination with ground fault circuit interrupters, are suitable for use as service disconnects. Other devices that are used to protect individual circuits, circuits within equipment or appliances, or circuit protectors without on and off features, are not suitable for use as service disconnects.

The removal of a plug or cartridge fuse from its fuseholder, while serving to de-energize the circuit, does not provide service disconnection. Panelboard switches, pullout switches and some industrial control switches are suitable as service disconnects. Note that pullout switches, while they serve as a fuse puller, do have switchblades and contact jaws and are tested as switches.

- C. Overcurrent protection suitable as branch or feeder protection must be provided for service conductors. Miscellaneous, miniature and micro fuses, thermal cutouts, relays and other supplementary overcurrent protection are not acceptable; however, “special purpose fuses” which are suitably rated for use as branch circuit, feeder, or service overcurrent protection may be used if:
 - 1) The fuses are non-interchangeable with fuses of incompatible ratings, and
 - 2) The panelboard is marked for use with the specific special purpose fuses.
- D. The number of service disconnects and overcurrent devices must conform to the *NEC*, Section 230.71.
- E. As required in Section 230.95 of the *NEC*, Panelboards rated for use on solidly grounded wye electrical services of more than 150 volts to ground must provide ground fault protection for each service disconnect rated 1000 amperes, or more. An exception is covered under Item 53.
- F. There must be provision for connecting a grounded service conductor and a grounding-electrode conductor. If there is a neutral bus, a means to bond the panelboard enclosure or mounting pan to the neutral bus is required unless the bus is mounted in electrical contact with the enclosure or pan.

In general, the grounding-electrode connection in service equipment is required to be made to the grounded service conductor at the neutral bar. However, Section 250.24(A)(4) of the *NEC* permits this connection to be made to the equipment grounding terminal bar, provided the main bonding jumper is a wire or a bus bar and is installed from the neutral bar to the equipment grounding terminal bar. If in a panelboard suitable for use as service equipment, the main bonding jumper wire or bus bar is provided for field installation, instructions are marked on the panelboard for proper installation of the jumper.

A panelboard with the neutral insulated from the enclosure may be marked “Suitable for use as service equipment when not more than six main disconnecting means are provided” when the following conditions are met:

- A. There must be at least one combination of switching units that can be mounted to occupy all available space for switching units; and, whether by using handle ties or similar devices, not more than six main disconnects will result (including factory-installed disconnects).

- B. With this combination of switching units, no more than six overcurrent-protective devices will be connected to each ungrounded service conductor.

Note that a panelboard marked “Suitable for use as service equipment when not more than six main disconnecting means are provided” may permit some combinations of switching units varying in ampere ratings and physical size that would exceed the six disconnect rule on a completely filled panelboard. The six disconnect rule can be exceeded if handle-ties are not installed where needed.

Panelboards marked as noted above and used as service equipment must have the neutral bonded to the enclosure as required by Section 408.3(C) of the *NEC*. These panelboards are provided with means to accomplish this bonding. When the panelboard is not used as service equipment, the neutral bonding means must not be installed. This would violate Section 250.24(A)(5) of the *NEC* and would constitute a fire hazard as noted in Item 50 of this Marking Guide.

A panelboard with the neutral factory-bonded to the enclosure is marked “Suitable only for use as service equipment. Install no more than six main disconnecting means.”

Some panelboards may have the required number of handles and service overcurrent devices, when the maximum number of the smallest units are installed and used without handles ties or similar devices. These panelboards may have the shorter marking “Suitable for use as service equipment” or “Suitable only for use as service equipment.”

Class CTL lighting and appliance panelboards without main overcurrent protection usually are not marked suitable for service equipment use. Such panelboards, with not more than 10 percent of their overcurrent devices rated 30 amperes or less, however, may be suitable for use as service equipment. They are marked “Suitable for use as service equipment when not more than six main disconnecting means are provided and when not used as a lighting and appliance branch-circuit panelboard; see Section 408.34 of the 2005 *NEC*.”

A panelboard intended for service equipment use must have the marking “Service Disconnects” near the switch or circuit breaker handles. If this is not done in the factory, pressure sensitive labels must be provided. This marking identifies the service disconnects when branch disconnects are also present. This is required by Section 230.70(B) of the *NEC*.

10. CABINETS AND ENCLOSURES

Panelboards are installed in cabinets, cutout boxes, or within compartments of other equipment, such as deadfront switchboards. Some panelboards are shipped from the factory in an enclosure designed for their use. When they are, the manufacturer is permitted to place the UL Listing Mark “Enclosed Panelboard” with or without additional modifying phrases on the assembly or use a “Panelboard” Listing Mark with or without additional modifying phrases with an “Electric Cabinet Box” Listing Mark and an “Electric Cabinet Front” Listing Mark.

Except for the panelboards intended for service equipment use discussed in Item 27, it is the responsibility of the installer to match a panelboard with an enclosure that is suitable in size and construction. The enclosure must meet the requirements of the *NEC* including wiring space, wire

bending space, and environmental conditions.

Because of the importance of grounding and bonding at service locations, UL requires that a panelboard marked as suitable for use as service equipment be identified with a particular box. Unless the panelboard cannot readily be removed from the box in which it is shipped from the factory, UL also requires that the panelboard marking identify the box or boxes with which it is intended to be used. Panelboards intended to be used in certain enclosures (i.e., for a Short-Circuit-Current Rating greater than 10,000 amperes rms symmetrical) are either marked to identify the enclosure by manufacturer's name and catalog numbers, or may identify suitable enclosure by specifying minimum overall dimensions of length, height, and width.

The suitability of an enclosure for environmental conditions for which it has been investigated is indicated by an enclosure type designation. One or more of the type designations indicated on the following pages are marked inside or outside the panelboard enclosure. This marking helps inspection authorities to judge whether an enclosure is suitable for a specific environment as mentioned in Section 110.3(A)(1) of the NEC. Enclosure type designations are coordinated with requirements in Section 110.28 of the NEC.

***See page 17 for Enclosure Types.**

An enclosed panelboard marked with an enclosure designation of Type 3, 3S, 4, 4X, 6 or 6P may additionally be marked "Raintight" or "Rainproof." An enclosed panelboard marked with an enclosure designation of Type 3R may additionally be marked "Rainproof."

Some enclosed panelboards have a semi-flush enclosure which has a flange extending from the sidewalls. This type of enclosure is intended to be mounted such that the front portion of the enclosure projects out of the wall and the rear portion extends within the wall in which it is mounted. These panelboards are marked with instructions regarding the proper overlap or flashing to be provided in the installation.

An enclosed panelboard intended for use in a Recreational vehicle is marked "Enclosed RV Panelboard" or equivalent.

For some panelboards, it is intended that unused openings in the enclosure be closed by filler plates. These panelboards are marked with the catalog number of the filler plates to be used, and the manufacturer is required to have the plates available. Use of the filler plates facilitates compliance with Sections 110.12(A) and 408.7 of the NEC, which requires unused openings in cabinets, equipment housings, etc., to be effectively closed.

11. ENCLOSURE TYPES

Type	Number Intended Use and Description
1	Indoor use primarily to provide a degree of protection against limited amounts of falling dirt.
2	Indoor use primarily to provide a degree of protection against limited amounts of falling water and dirt.
3	Outdoor use primarily to provide a degree of protection against windblown dust, rain, sleet and damage from external ice formation.
3R	Outdoor use primarily to provide a degree of protection against rain, sleet and damage from external ice formation.
3S	Outdoor use primarily to provide a degree of protection against windblown dust, rain and sleet; external mechanisms remain operable while ice laden.
4	Indoor or outdoor use primarily to provide a degree of protection against splashing water, windblown dust and rain, hose-directed water, and damage from external ice formation.
4X	Indoor or outdoor use primarily to provide a degree of protection against splashing water, corrosion, windblown dust and rain, hose-directed water, and damage from external ice formation.
5	Indoor use primarily to provide a degree of protection against settling airborne dust, falling dirt and dripping non-corrosive liquids.
6	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during occasional temporary submersion at a limited depth, and damage from external ice formation.
6P	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during prolonged submersion at a limited depth, and damage from external ice formation.
12, 12K	Indoor use primarily to provide a degree of protection against circulating dust, falling dirt and dripping non-corrosive liquids.
13	Indoor use primarily to provide a degree of protection against dust and spraying of water, oil and non-corrosive coolants.

12. PANELBOARDS WITH OVER 42 OVERCURRENT PROTECTIVE DEVICES - OPTIONAL MARKING

A marking may be applied by the manufacturer to indicate compliance with Section 408.34 of the 2005 NEC. This marking indicates that “Lighting or appliance branch circuits are not to be supplied directly through more than 10 percent of the branch circuit overcurrent protective devices.”

If applied, this marking is required to be readily visible after the panelboard has been installed and is intended to alert the installer and inspection authorities that the panelboard does not meet the requirements for lighting and appliance panelboards as described in the 2005 NEC.

13. COPPER OR ALUMINUM WIRING

Panelboards intended for use with aluminum wire require special consideration. First, panelboard wire connectors must be recognized for use with aluminum wire. Second, the size of the enclosure must be increased because aluminum wire is larger than copper wire of the same ampacity. This requires more cross sectional area for the wiring gutters and more wire bending space at terminals and where wires enter the enclosure. Third, the larger wiring terminals may make it necessary to check through-air electrical spacings between adjacent terminals of opposite polarity.

Because of these considerations, UL requires the wiring diagram or nameplate to be marked to indicate the use of copper and/or aluminum wire if the symbol “AL” appears on any part that is intended for use in the panelboard. It may be necessary to remove a cover, front or trim to see the marking.

If the panelboard has not been evaluated for use with aluminum wire, the marking will read “Use Copper Wire Only.”

If the wiring terminals and other factors have been evaluated for use with copper and aluminum wire, the panelboard is required to be marked “Use Copper or Aluminum Wire.”

If only some terminals have been evaluated for use with aluminum and copper wire with the remainder acceptable for use with copper wire only, the panelboard is required to be marked “Use copper wire only, except at terminals...” Variations of this marking are also permitted if the terminals that have been evaluated for use with aluminum wire are identified.

14. TEMPERATURE RATING OF INSTALLED CONDUCTORS

In general, the testing and construction of panelboards are based on the use of 60°C ampacities for wire size Nos. 14–1 AWG and 75°C ampacities for wire size Nos. 1/0 AWG and larger, taken from Table 310.15(B)(16) of the NEC, with no adjustment made for correction factors. Panelboards are marked to indicate temperature ratings and sizes of conductors that can be used.

If the equipment is normally intended for wire sizes within the range 14–1 AWG but is marked 75°C only or 60/ 75°C, it means that the 75°C wire may be used at full 75°C ampacity.

Higher temperature rated conductors than specified may be used if the size is based on the preceding statements. When the connection is made to a circuit breaker or switch unit within the equipment, such a unit must also be marked for the temperature rating of the conductor.

Single-phase, 3-wire panelboards may be marked for use with reduced wire sizes as indicated in Section 310.15(B)(7) and Table 310.15(B)(7) of the NEC, when installed as residential service equipment.

A panelboard not having facilities for the normal size wire may have an ampere rating that is based solely on use in accordance with the requirement. In this case, the panelboard must be marked to indicate that the rating is applicable only if the panelboard is installed as single-phase, 3-wire residential service equipment. For example, a panelboard rated “200 ampere maximum— see main circuit rating” could be designed for an enclosure that provides 6 inches of wire bending space suitable for 2/0 AWG in accordance with Table 312.6(B) of the *NEC*. The panelboard would then have to be marked to indicate that the 200 ampere rating applies only if the panelboard is installed as single-phase, 3-wire residential service equipment. With a 175 ampere or smaller main breaker installed, the panelboard could be installed elsewhere since bending space would be adequate for the wire sizes required by Table 310.15(B)(16).

15. FIELD INSTALLED UNITS OR EQUIPMENT

A panelboard to which a unit, such as a circuit breaker, switch, or the like, may be added in the field is required to be marked to identify the units that can be added. Units made by different manufacturers or of a different style are not identical in all details and therefore may not be interchangeable.

Exceptions exist for:

- 1) Classified molded-case circuit breakers rated 15 to 60 A, 120/240 V ac, that have been investigated and found suitable for use in place of other Listed circuit breakers in specific Listed panelboards. These breakers are limited for use with panelboards rated 225 A or less, 120/240 V ac. The circuit breakers are Classified for use in specific panelboards in accordance with the details described on the circuit breaker, or in the publication provided therewith. These breakers are suitable for use in equipment connected to circuits having a maximum available system short-circuit current of 10 kA.
- 2) Classified surge-protective devices (SPDs) rated 120/240 V ac, that have been investigated and found suitable for use in specific Listed panelboards. These SPDs are limited for use with panelboards rated 120/240 V ac, for use in specific panelboards in accordance with details described on the SPD, or in the publication provided therewith. These SPDs are suitable for use in equipment connected to circuits having a maximum available system short-circuit current of 10 kA. Classified SPDs will be marked with one of the following Type designations:
 - a. Type 1 – Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service equipment overcurrent device, as well as the load side, including watt-hour meter socket enclosures and intended to be installed without an external overcurrent protective

device.

- b. Type 2 – Permanently connected SPDs intended for installation on the load side of the service equipment overcurrent device; including SPDs located at the branch panel.

Plug-in clips and blades must be matched if poor connections and overheating are to be avoided. Additionally, over-surface and through-air electrical spacings, between live parts of opposite polarity and to grounded metal, often depend on the proper mating of units and the bases into which they are plugged or bolted.

Panelboards are usually provided with the required main line and neutral terminals. The overcurrent protection units are furnished with required load terminals. However, if the pressure wire connectors are not provided on the panelboard when shipped, the panelboard is required to be marked stating which pressure wire connectors or component terminal kits are acceptable for use with the panelboard.

A main terminal kit consisting of individual wire connectors or an assembly of terminals, bus connectors and means for bolting or plugging, is required to be marked with the manufacturer's identification and catalog designation. If this is not done, the carton is required to be marked. A separate feed-through terminal kit requires similar marking and, if a separate enclosure is required for its use, this too must be marked and provided with instructions for its use.

If a panelboard is intended to be used in a certain box or boxes and neutral terminals are mounted in that box, both the panelboard and the box are required to be marked. These markings must indicate that each shall be used with the other unless the panelboard and box are shipped together from the factory. Some column type panelboards have the neutrals mounted in a separately listed junction box. In this case, correlating markings on each device are required.

Panelboards may have multiple ratings when intended for use on systems which include a neutral. For these panelboards, the neutral may be factory or field installed where marking on the neutral assembly and panelboard correlate and installation instructions are provided. The neutral may be omitted when no line to neutral loads are served.

A panelboard that has space for the installation of additional branch circuit switches, circuit breakers or fuseholders may be shipped from the factory without the necessary branch-circuit bus bars. In this case, the panelboard must be marked to indicate the catalog number or the equivalent of the bus bar kit that is to be used when the unit is installed.

A panelboard supplied with branch-circuit bus bars for adding a branch-circuit unit is required to be marked on a wiring diagram, on the branch-circuit bus bar or in some other location. This marking indicates the ampacity of the bus bar, unless its ampacity is equal to or greater than the maximum current rating of any unit to be connected to the panelboard.

Markings on panelboards that employ plug-in units require the use of a hold-down kit when the units are back-fed and field installed supply conductors are terminated on the plug-in unit. The marking indicates: "Back-fed _____ requires hold-down kit Cat. No. _____ " or the equivalent. An identification of the applicable back-fed unit is specified in the first blank - for example, circuit breaker, fused switch, or terminal kit; and the catalog number of the required hold-down kit is specified in the second blank.

16. MODULAR PANELBOARDS

A modular panelboard system includes the following types of modules: an enclosed panelboard or a column- type panelboard, and one or more accessory modules such as termination boxes, enclosed switches, or circuit breaker enclosures. Each module of the system has one or more openings in one or more sides of the enclosure for bus bar connections, or terminals for field wiring connections to other related modules. Typical applications for these modular systems include apartment houses and strip malls. Panelboard modules used in these modular panelboard systems are labeled “Panelboard Module” and all other system modules are labeled “Panelboard Accessory Module.”

A panelboard module to which another panelboard accessory module — such as a termination box, enclosed switch, circuit breaker enclosure or the like — may be added in the field is required to be marked to identify the panelboard accessory modules that can be added unless the entire modular panelboard system is marked with a common series designation. In this case, the series designation is marked on the panelboard module and each panelboard accessory module.

17. CLASS CTL PANELBOARDS

Section 408.34 of the 2005 *NEC* defines a lighting and appliance panelboard as a panelboard having more than 10 percent of its overcurrent devices rated 30 amperes or less, for which neutral connections are provided. Once a panelboard is classified as a lighting and appliance branch-circuit panelboard, certain limitations are placed on the number of overcurrent devices that may be installed.

Section 408.35 of the 2005 *NEC* states that physical means shall be provided to prevent the installation of more overcurrent devices than the number for which the panelboard was designed, rated and approved. In no case shall the number exceed 42 (other than those provided for in the mains) in any one cabinet or cutout box. This has the effect of limiting the number of circuits in a lighting and appliance branch-circuit panelboard.

Using this concept, UL adopted the term “Class CTL” (a contraction of “Circuit Limiting”) to help electrical inspectors approve installations of lighting and appliance panelboards. Panelboards classified as lighting and appliance branch-circuit panelboards may be marked “Class CTL Panelboard” before they leave the factory.

Some panelboards that have more than 42 branch- circuit overcurrent protective devices and neutral terminals have space for field installation of extra units. This could mean more than 10 percent of the overcurrent devices will be rated 30 amperes or less when the panelboard is completely filled. In order to prevent misapplications, specific markings are permitted on panelboards of this design. See Item 30 for details.

If more than one size unit is intended for use in a lighting and appliance branch-circuit panelboard (such as a full-size and half-size circuit breaker), the smaller unit is required to be marked “Class CTL” or “CTL.” The larger may also be so marked.

Since space is limited on these units, the marking may not be visible after the unit is installed. The CTL Unit marking is of significance only in those areas where the older style non-CTL, half-size,

twin, and similar units are still available to the installer.

18. IDENTIFICATION OF PHASE ARRANGEMENT AND THREE-PHASE, FOUR-WIRE DELTA SYSTEMS

Section 408.3(E) of the NEC specifies the required phase arrangement for 3-phase buses. This Section also notes that the B-phase shall be that having the higher voltage to ground on a 4-wire delta system. This Section does allow other busbar arrangements for addition to existing installations so long as the arrangement is marked. Section 110.15 of the NEC requires markings to identify the B-phase as the higher voltage to ground on a 4-wire delta connected system when the midpoint of one phase is grounded.

Accordingly, UL requires that panelboards with other than an A-B-C bus bar arrangement be marked to indicate the bus bar arrangement. Also, UL requires that panelboards intended for a 240/120 volt, 3-phase, 4-wire, delta system be marked to identify the different bus bars with reference to the voltage between them. However, if a panelboard is intended for use only on this system, the main bus bar having the higher voltage to ground may be identified by an orange marking or by tagging. Such a panelboard must be marked to indicate the necessary voltage rating of the device for each branch-circuit position.

B-phase is 208 volts to ground while the A- and C-phases are only 120 volts to ground. Some circuit breakers, like single-pole breakers for use with handle ties rated 120-240 volts, should not be connected to the phase that is 208 volts to ground. Also, fuse holders for plug fuses should not be connected where the voltage to ground exceeds 150 volts.

Generally, the B-phase is used only in conjunction with either the A- or C-phase for a 240 volt single phase branch circuit or with both the A- and C-phase for a 3-phase branch circuit. Circuit breakers or cartridge fuses rated for straight 240 volt systems are suitable for this use.

The NEC requirements in Section 408.3(E) do not cover 3-phase panelboards having two buses and a neutral and intended for use on a 240 volt, 3-phase, 3-wire grounded B phase system. In these panelboards, the neutral is connected to the grounded B-phase. UL requires a phase arrangement of A-, C-, with the neutral as the B-phase.

19. FACTORY BONDED NEUTRALS

Some panelboards are intended only for service equipment use on an AC system requiring grounding of the system (see Items 18-21 under "Suitable for Use as Service Equipment"). These panelboards may have the enclosure bonded to the neutral at the factory. This eliminates the need for a neutral insulating support base.

It is difficult to check for unintentional grounds on the installed building wiring when the neutral is mounted directly on the enclosure. Therefore, some manufacturers provide an insulating liner under the neutral to permit use of a megger or similar resistance measurement instrument. However, this does not provide the electrical spacings required for the neutral if the panelboard is used away from the service as a feeder or branch-circuit panelboard. These panelboards are

required to be marked “Bonded Neutral — Remove bonding device for test purposes only” or an equivalent marking.

Most installers recognize the importance of bonding the neutral to the enclosure at the service. Many do not realize, however, that it is just as important to omit the bonding and provide a fully insulated neutral when the panelboard is used in non-service applications

If neutrals are bonded at distribution points on the load side of the service disconnecting means, the neutral currents take parallel paths through neutral conductors and the grounding conductor (which may include metal raceways). If neutral conductors open, the full neutral current flows over the grounding conductor system (which may include metal raceways). As a result of this loss of the neutral connection, steel raceway joints and box connections overheat, creating a potential fire hazard.

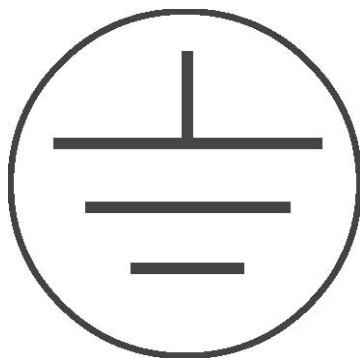
20. EQUIPMENT GROUNDING TERMINAL BAR

Section 408.40 of the NEC requires the installation and use of a terminal bar for equipment grounding conductors for panelboards used with non-metallic raceway or cable, or where separate equipment grounding conductors are provided. This terminal bar may be installed on the panelboard or its enclosure. A terminal bar assembly kit must include instructions for installation and panelboard or enclosure markings.

Unless it employs a wire-binding screw, markings must show all acceptable wire sizes and wire combinations for each terminal. A panelboard for use without equipment grounding conductors is not required to provide for a grounding terminal bar. In this case, however, the panelboard must be marked to limit its use to installations in which equipment is grounded by connection to metal raceway or metallic cable sheaths.

The equipment grounding terminal or terminal assembly in a panelboard is identified by one of the following methods:

- The terminal assembly or the heads of the terminal screws being green;
- Marking adjacent to the terminal or on the wiring diagram indicating “Equipment Grounding Terminal” or equivalent wording; or
- Marking of the grounding symbol (see below) adjacent to the terminal or on the wiring diagram along with “Equipment Grounding Terminal” or other words defining the symbol. The symbol may be used without the additional wording if markings provided with the Panelboard define the symbol.



GROUNDING SYMBOL
(IEC417, Symbol 5019)

21. GROUND-FAULT PROTECTION OF EQUIPMENT

In accordance with Section 230.95 of the NEC, a panelboard marked for use as service equipment for 3-phase, 4-wire solidly grounded wye-connected services rated in excess of 150 volts to ground but not exceeding 600 volts phase-to-phase shall be provided with ground-fault protection for each service disconnecting means rated 1000 amperes or more.

Exception No.1 for Section 230.95 of the *NEC* indicates that this does not apply to service disconnects for a continuous industrial process, where a non-orderly shutdown introduces additional or increased fire and shock hazards.

In accordance with this Exception, UL permits a Listed panelboard marked for service equipment use and rated for use on solidly grounded wye-connected electrical services of more than 150 volts to ground to omit ground-fault protection if the panelboard is marked "Suitable For Use As Service Equipment Only When Supplying A Continuous Industrial Process." This shortened wording is not intended to circumvent the need for a judgment. Inspectors concerned about the hazards of a non-orderly shutdown decide whether or not ground-fault protection is needed.

In some panelboards, only a shunt trip service disconnect is provided. In this case, the marking on the panelboards gives the manufacturer's name and the catalog number of the ground-fault protection equipment with instructions covering its interconnections.

Panelboards provided with ground-fault protection are required to be marked to indicate the circuit-main, feeder, or branch-circuit that is so protected. If a marking on the ground-fault sensing or relaying equipment is not visible from the front of the panelboard with its cover removed, a separate marking, such as on the wiring diagram, is required.

If a transformer providing control voltage for ground-fault protection is connected to the line side of the main disconnect, this disconnect may be identified as the "main." In this case, the panelboard is required to be marked "Danger — this main does not disconnect control and instrument circuits" adjacent to the main disconnect.

In a panelboard with ground-fault protection, the part of the neutral bus used for load terminations is required to be marked “WARNING — Do not connect grounding conductors to these or any other neutral terminals, to do so will defeat ground-fault protection.” This marking must be placed on or adjacent to the neutral.

22. MAXIMUM SIZE FUSEHOLDERS OR CIRCUIT BREAKERS

If the ampacity of a branch bus bar or wire is less than the maximum current rating of any fuse accommodated by a fuseholder it supplies, or if it is less than the current rating of any trip unit (including rating plugs) of an interchangeable trip circuit breaker that it supplies, UL requires a clear and permanent marking, plainly visible when the fuse or trip unit is being replaced. This prevents the use of a fuse, trip unit, or rating plug having more ampacity than a bus bar or wire.

A panelboard with branch-circuit bus bars that permit adding a branch-circuit unit, circuit breaker, switch, or fuseholder requires markings on the wiring diagram, the branch-circuit bus bars, or some other location. Markings indicate the ampacity of the bus. This marking is not required if the ampacity of the bus bar is not less than a) the maximum current rating of any unit to be connected to it; or b) the current rating of the panelboard.

23. PANELBOARDS WITH PROVISIONS FOR WATT-HOUR METERS

Separate meter sockets are required to be marked with a continuous ampere rating. In some cases, meter sockets also may have a maximum use (intermittent) ampere rating of not more than 125 percent of the continuous ampere rating. Similar markings are required for any meter mounting base in a panelboard. The continuous ampere rating may be less than the circuit that contains the meter mounting base. This means that, for example, a 125 ampere panelboard can have a meter mounting base rated “125 Amps (100 Amps Continuous).” Some inspectors may judge that a continuous duty meter socket is not needed because of a panelboard’s load diversity. Continuous duty sockets can be required when load and environmental conditions would cause overheating in panelboards.

If the socket jaws of meter mounting bases are mounted on terminals intended for field wiring, the panelboard is required to be marked to indicate the maximum torque to be applied to these terminals.

24. CIRCUIT BREAKER TRIP INDICATION

If the handle of a circuit breaker, or a simple extension of that handle, assumes other than the off position when the breaker trips, the trip position of the handle is required to be indicated. The method for resetting the breaker is also a required panelboard marking.

Marking the tripped position is not required for a separate, external operating handle that is not part of the circuit breaker. Such a handle may remain in the on position when the breaker trips. These constructions may be encountered in panelboards Listed for use in hazardous locations where operating springs in the circuit breaker mechanism do not provide sufficient tension to operate

external handles.

25. WIRING TERMINALS

Section 110.14 of the NEC, states that terminals for more than one conductor must be identified. In all cases, marking is required to identify the combinations and sizes of conductors for each terminal. Marking is not required where conductors in parallel are secured by a single wiring terminal having individual holes and set screws for each conductor.

Where conductors in parallel are secured at a terminal (one connector with one or more barrels or multiple individual wire connectors) of an enclosed panelboard and where the connectors will accommodate more than one combination of conductors (size and number) that will have the required ampacity, the wiring diagram will state the number and size of wires for which the terminal is acceptable unless the wiring space is suitable for all combinations of conductors that have the required ampacity.

Tightening torque is marked for all panelboard terminals (other than wire binding screws) except when installed units have their own marking.

UL requires that an individual terminal be provided for the connection of each branch-circuit neutral conductor and, with one exception, that the number of individual terminals be not less than 75 percent of the total number of individual fuseholder or circuit-breaker poles capable of being installed in the panelboard. Under the exception, the number of terminals may be reduced to 50 percent if the panelboard is marked to indicate the maximum number of circuits and the need to use multipole branch-circuit units to limit the number of terminals to a specified number.

26. MAIN OR MAIN DISCONNECT

Except for a panelboard that has the “Service Disconnect(s)” identified, a switch or circuit breaker that controls all load circuits from the panelboard, other than a feed-through circuit, is required to be marked “Main” and no other switching device is permitted to have this marking. If two or more switches or circuit breakers control all load circuits, other than a feed-through circuit, they are required to be marked “Main Disconnect” either on or adjacent to each unit if there are other switches or circuit breakers in the panelboard.

27. WIRE BENDING SPACE

A panelboard constructed in accordance with Exception No. 3 of Section 408.55 of the NEC is required to be marked by means of a diagram that shows and specifies the method of wiring that shall be used to accomplish the 90-degree bend.

Minimum wire bending space requirements for panelboards rated for use with aluminum conductors are based on the use of compact stranded conductors made from AA-8000 series electrical grade aluminum alloy. See NEC Section 310.106(B).

28. ACCESSIBLE ONLY TO QUALIFIED PERSONS

Section 240.40 of the NEC requires a disconnecting means on the supply side of cartridge fuses where the fuses are accessible to other than qualified persons. Section 408.38 requires all panelboards to be deadfront unless they are accessible only to qualified persons. UL requires such panelboards to be marked “This panelboard shall be located where accessible only to qualified persons.”

29. INVESTIGATED FOR USE IN OPTIONAL STANDBY SYSTEMS (NEC ARTICLE 702 APPLICATION)

Panelboards may be constructed with interlocked switching devices or designed for use with interlock kits that have been investigated for use in optional standby systems in accordance with Article 702 of the NEC. Panelboards shipped with factory installed interlocked switching devices that have been investigated for use in optional standby systems are marked “Suitable for use in accordance with Article 702 of the National Electrical Code ANSI/NFPA 70;” panelboards available for use with field installable assemblies that have been investigated for use in optional standby systems are marked “Suitable for use in accordance with Article 702 of the National Electrical Code ANSI/NFPA 70 when provided with interlock kit Cat. No. _____.”

29A. INVESTIGATED FOR USE IN WITH INTERCONNECTED PARALLEL ELECTRIC POWER PRODUCTION SOURCES (NEC ARTICLE 705 APPLICATION)

Panelboards may be intended for interconnection with one or more electric power production sources operating in parallel with a primary source(s) of electricity, in accordance with Article 705 of the National Electrical Code, NFPA 70. Panelboards with this marking have provisions for connection(s) as noted in either (a) and/or (b):

- a) Supply Side Connection - Panelboards intended for use in accordance with Section 705.12(A) of Article 705 of the National Electrical Code, NFPA 70, shall be permitted to have provisions for interconnecting parallel power sources on the supply side of the service disconnecting means.
- b) Load Side Connection - Panelboards for use in accordance with Section 705.12(D) of Article 705 of the National Electrical Code, NFPA 70, shall be permitted to have one or more load side disconnects for the interconnection of parallel power sources.

Markings associated with this application are provided as noted below:

Disconnect Markings:

- 1) Each disconnect or provision for connection for interconnected parallel power production source(s) will be marked “Parallel Energy Source Disconnect”, or “Parallel Energy Source Tap”, or the equivalent, or be provided with a space for the source(s) to be labeled in the field.

- 2) A marking shall be placed near each Parallel Energy Source Disconnect to be visible when the terminals are visible to warn the user that both the line and load terminals may be energized when the breaker is in the open (Off) position.
- 3) Panelboards with the load side disconnect(s) intended for connection to parallel power sources positioned at the opposite end from the main input in accordance (NEC 705.12(D)(7)) are marked with the following, or equivalent:

WARNING
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS
OVERCURRENT DEVICE

Panelboard Markings:

- 1) “Suitable for use with interconnected parallel electric power production sources”, “Suitable for use in accordance with Article 705 of the National Electrical Code, NFPA 70”, or the equivalent.
- 2) “Turning Off Parallel Energy Source Disconnect does not deenergize this panel. Turn off power from all sources supplying this equipment before working inside.” or equivalent wording.
- 3) For panelboards intended for load side connections to other power production sources (item b above), the panelboard will be marked with the maximum ampere rating for all overcurrent devices intended for connection to electric power production sources operating in parallel with a primary source(s).

30. TAPS

Some panelboards may have terminals or provisions for terminals, marked as taps, located on the supply side of the service disconnecting means. The suitability of these terminals as taps connected on the supply side of the service disconnect is intended to be determined in accordance with *NEC*® Sections 230.46, 230.82, and 705.12.

Panelboards are not Listed to have their busbars tapped in the field unless there are existing holes in the busbars marked with the word “Tap” adjacent to the holes in the factory. Other holes in the busbar that are not marked with the word “Tap” are intended for the connection of overcurrent devices, other device’s as identified by the product markings and in the installation instructions, or other uses identified by the manufacturer. When the electrical equipment Listing does not include product markings or instructions for tapping busbars, this situation should be treated like any other field modification of Listed equipment.

Some Listed power equipment may have installation instructions with specific directions on tapping the busbars. If this is the case, this equipment can be field modified, following those manufacturer’s instructions, in accordance with the National Electrical Code® (NEC) Section 110.3(B). The UL White Book identifies the required markings for field-installed equipment that have been evaluated by UL. For additional information, please see the guide information for Panelboards (QEUY).

Drilling or enlarging holes in busbars can increase the current density and reduce current carrying capacity. Some equipment is constructed with fully rated busbars, which have a typical current density of 1000 A per square inch of cross sectional area for copper and 750 A per square inch of cross sectional area for aluminum. However, some equipment use busbars at a higher current density and have temperature testing conducted to determine compliance with UL's requirements.

Removing busbar material can result in higher operating temperatures, and additional holes can potentially weaken the busbar, which adversely affects the short circuit rating of the equipment required by NEC Section 110.10. Both sufficient wiring space and wire bending space need to be provided for the conductors and the wire connector at the tap connection. In measuring the wiring space, AHJs need to consider the possibility of the connectors rotating, which may result in reduction of the spacing between uninsulated live parts of opposite polarity and uninsulated live parts and ground.

Wire connectors (lugs) need to be Listed for the purpose and have the proper ratings for specific application, and the mounting hardware for wire connectors needs to be properly selected and attached with the correct torque. The potential reduction of required spacings from the wire connectors or fasteners to the enclosure or other busbars also needs to be evaluated. In completing the modification, all foreign material such as cutting oil, burrs and metal shavings needs to be removed from the equipment enclosure. Temporarily removed materials such as insulating barriers need to be returned to their original positions and secured. The above are just a few of the concerns and items that must be inspected, checked and reviewed where such modifications are made to this type equipment.



Marking and Application Guide

SWIMMING POOL EQUIPMENT, SPAS, FOUNTAINS AND HYDROMASSAGE BATHTUBS

JANUARY 2013

Swimming Pool Equipment, Spas,
Fountains and Hydromassage Bathtubs
Marking and Application Guide

PREFACE

The growing popularity of home swimming and related activities has led to an increase in the number of swimming pools, spas, hot tubs and hydromassage bathtubs in use. Each of these products has different UL markings and different installation requirements.

UL has developed the Swimming Pool Equipment, Spas, Fountains, and Hydromassage Bathtub Marking Guide for inspectors, utilities, contractors, installers, users, designers, and other interested parties to aid in understanding this equipment and the applicable codes and standards in order to facilitate a reasonably safe and code-compliant installation. This equipment is intended to be installed in accordance with the *National Electrical Code*® (*NEC*®), as well as other mechanical, fuel gas, building and plumbing codes as applicable, and their listing. These markings are required by the applicable UL and other Standards, and are part of the listing.

UL Marking and Application Guides are updated as necessary due to new product development, changes in the codes, or the need for clarification. To confirm the current status of any UL Marking Guide, please consult the Code Authorities page of the UL Web Site at <http://www.ul.com/codeauthorities>.



Your comments or suggestions are welcome and appreciated. They should be sent to:

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INTRODUCTION

USE OF THIS GUIDE

This guide is intended to assist regulatory authorities, designers, and installers in determining the suitability of specific swimming pool, spa, hydromassage bathtub and fountain products in a particular installation and use, and to address concerns related to fire, shock, plumbing, gas, and/or mechanical hazards.

Products are Listed or Classified by UL under an appropriate product category. A four-letter code (shown in parenthesis) following every category title in this guide is the UL product category code designation. A list of product categories evaluated by UL, along with the applicable standard(s), can be found in Appendix B.

Each UL product category code provides a direct link to the Guide Information for the product category. The Guide Information includes the scope of the products covered, information relating to limitations or special conditions applying to the product, the requirements used for the investigation of the products, installation and use information, and information on product markings and the UL Mark to be used on the product. Guide information is available in the UL White Book and online at www.ul.com/database.

The product markings identified in this guide do not include every possible marking that could be provided either on a product or in its installation or operation instructions. The purpose of these markings is to provide you with an indication of the type of text and location of markings that address features that may be critical in determining if a product is certified and / or if it is installed correctly. Refer to the specific Guide Information for the product category for additional marking information.

The numbering for code sections used in this document may change as the specific code is updated. A list of model codes and standards applicable for each product can be found in Appendix C.

Additional information can be found at www.ul.com.

INFORMATION ON LISTING VERSUS CLASSIFICATION

Most codes and regulations require the certification of this equipment to applicable safety-related standards. They also may require this equipment to be certified to energy performance standards as well. Products that are certified to safety-related standards have been evaluated with regard to all reasonably foreseeable safety-related hazards, including fire, electrical shock and mechanical hazards. Such products are termed “UL Certified” or “UL Listed.” Products that are certified to a limited range of hazards, or for use under specific conditions are termed “UL Classified”.

It is important to distinguish the difference between “UL Certified” or “UL Listed” and “UL Classified” and the relation these terms have with the term “listed,” as used in various codes. The term “listed” in the codes generally indicates that the product is required to be evaluated in accordance with the appropriate standard(s) by an independent third party certification organization such as UL. The term “listed” in the codes should not be confused with the term “UL Listed,” as explained above. It is important to recognize that not all certification agencies make this distinction in their certification services.

INFORMATION ON UL MARKS

There are several types of UL Marks that can be found on alternative energy equipment. General information on each of these Marks is provided below. Each has its own specific meaning and significance. The only way to determine if a product has been certified by UL is to look for the UL Mark on the product itself.

The UL Mark on a product means that UL has tested and evaluated representative samples of that product and determined that they meet the requirements in the applicable standard(s). Under a variety of UL programs, certified products are periodically checked by UL at the manufacturing facility to determine that they continue to comply with the standard(s).

The UL Marks may only be used on, or in connection with products certified by UL, and under the terms of a written agreement between the manufacturer and UL.

UL Listing Mark

This is one of the most common UL Marks. If a product carries this Mark, it means UL found that representative samples of this product met UL's *safety* requirements. These requirements are primarily based on UL's own published Standards for Safety, or other recognized third party standards. The UL Listed Mark includes the UL symbol, the word "Listed," the product or category name, and a control number assigned by UL.



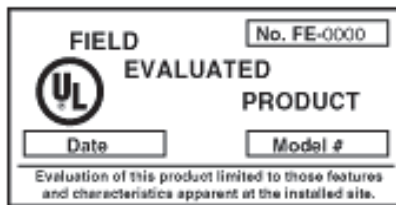
UL Classification Mark

This Mark appears on representative samples of products that UL has evaluated but only with respect to specific properties, a limited range of hazards, or suitability for use under limited or special conditions. The UL Classified Mark includes the UL symbol, the word "Classified," a statement of the scope of evaluation, the product or category name, and a control number assigned by UL.



FIELD EVALUATIONS

You may encounter situations in which you are unable to determine if a product has been listed by a third-party organization. Or in other situations you might encounter a product bearing a listing label that may have been modified in the field, and now you question whether or not the product still complies with the applicable standard. UL offers a field evaluation service that provides data to assist you in making your decision whether to accept the product and/or approve the installation. Anyone directly involved with a product – including manufacturers, owners, contractors, and regulatory authorities – can request a Field Evaluation. Detailed information for this program can be found on UL’s Web site at www.ul.com/field.



1. PERMANENTLY INSTALLED SWIMMING POOLS

1.1. GENERAL

This section covers UL Listed equipment that is wired and plumbed at the installation site for the construction of a swimming pool permanently installed in the ground or above the ground. The suitability of the interconnection of various components, as well as the supply connection is determined by the authority having jurisdiction. UL evaluates and Lists all electrical and mechanical components of these pools. This includes water heaters, pumps, luminaires, water treatment equipment such as ozone generators and chlorinators, junction boxes, transformers, potting compounds, pool cover operators, pool covers, pool alarms, and controls, as well as some pre-packaged assemblies of components referred to as equipment assemblies or “Skid Packs.” Equipment assemblies are usually intended for heated spas installed in the ground, but units without heaters are also suitable for small swimming pools permanently installed in the ground.

1.2. CONTROLS

General. These Listings cover units intended for the control of equipment used with swimming pools, spas or hot tubs. They typically consist of combinations of motor controllers and timers. Some may also have temperature-regulating circuits.

Listing Mark. The UL Listing Mark for these products includes a product name such as “Spa Controller,” “Swimming Pool Controller” or other similar product name.

Field Installation. UL Listed controls are intended for permanent connection to the electrical supply system and are intended to be mounted at a minimum of 5 feet from the inside walls of a swimming pool or spa. Some units have ground-fault circuit interrupter (GFCI)-protected convenience receptacles and are intended for mounting at a minimum of 10 feet away. These Listed products are suitable for both indoor and outdoor use, unless they are marked “For Indoor Use Only.”

Terminals On Load Side of GFCI Controls. A control with terminals on the load side of a ground-fault circuit interrupter (GFCI), provided to protect the field-installed conductors of an underwater lighting circuit, is marked to indicate that the field-installed conductors shall not occupy conduit, boxes or enclosures with the conductors of other circuits unless all other conductors are also on the load side of a GFCI.

Enclosures Intended For Direct Connection to a Wet-Niche or No-Niche Luminaire.

Controls intended for such use are marked “Suitable for direct conduit connection to a wet-niche or no-niche luminaire” or equivalent where visible after installation. Conduit termination locations suitable for such use are specifically identified.

1.3. JUNCTION BOXES

General. Products Listed under this category are suitable for use at the supply end of conduit that extends directly to the forming shell of a wet-niche luminaire or the mounting bracket of a no-niche luminaire in a pool, spa, or fountain. These junction boxes are also suitable for use as underwater junction boxes for fountains and decorative pools.

Listing Mark. The UL Listing Mark for these units includes the product name “Swimming Pool Junction Box.”

Field Installation. Swimming pool and spa luminaire junction boxes are provided with the means of independent termination for the equipment grounding conductors inside the box. Each termination for an equipment grounding conductor will accommodate one conductor in the range of No. 16 to No. 12 AWG. A junction box marked “Suitable for Use With a Low-Voltage Luminaire” has equipment grounding conductor terminations suitable for the range of No. 16 to No. 10 AWG. Junction boxes are also provided with means to terminate No. 8 AWG supplementary equipment grounding conductors for use where the wet-niche or no-niche luminaire is installed using non-metallic conduit. A junction box and cover combination with a volume of 100 cubic inches or less is marked with its volume in cubic inches. Installation instructions indicate the flexible cord type and conductor size or the range of cord diameter to be used with an installed strain relief device. If the strain relief means is to be field-installed, complete installation instructions are provided.

1.4. LUMINAIRES (See App. A–Figs. 1, 2, 4, 5)

Listing Mark. Underwater swimming pool luminaires come in six basic types as described below. Luminaires suitable for swimming pool and spa equipment are identified by a Listing Mark with one of these luminaire type designations, along with text to indicate they are suitable for swimming pools. The Listing Marks of these products include one of the following product names as appropriate:

“Dry-Niche Underwater Luminaire For Swimming Pool,”
“Mounting Bracket For No-Niche Luminaire,”
“No-Niche Underwater Luminaire For Swimming Pool,”
“Housing For Wet-Niche Luminaire,”
“Wet-Niche Underwater Luminaire For Swimming Pool,”
“Underwater Luminaire for Aboveground Non-Storable Swimming Pools,” “Convertible Underwater Luminaire for Aboveground Swimming Pools,” or
“Fiber-Optic Underwater Luminaire for Swimming Pools.”

Luminaires intended for fountains or other vessels not intended to accommodate the complete or partial immersion of persons have a different identification. These luminaires are identified as “Submersible Luminaires.” A typical Listing Mark would be “Dry-Niche Submersible Luminaire”. Luminaires with only this type of Listing Mark or product name have not been evaluated for swimming pool or spa installations. Some luminaires have been evaluated for use as both a swimming pool or spa luminaire and a submersible luminaire. Luminaires suitable for both uses bear Listing Marks identifying both uses.

Field Installation:

Dry-Niche Luminaires. These luminaires are intended for permanent installation only in the wall of a swimming pool or a field-fabricated spa, unless accompanying installation instructions describe the option of installation in the bottom of the pool or spa. These luminaires are intended to be installed with the top of the lens not less than 18 inches below the normal water level, unless otherwise marked. They are designed for servicing from the rear through a passageway behind the pool or spa wall, or, if mounted in the bottom of the pool or spa, in a tunnel underneath the pool or spa. When the luminaire is properly installed in a housing or “niche,” no water should enter the niche.

Wet-Niche Luminaires. These luminaires are intended for permanent installation only in the wall of a swimming pool or field-fabricated spa, unless accompanying installation instructions describe the additional option of installation in the bottom of the pool or spa.

These luminaires are also intended to be installed with the top of the lens not less than 18 inches below the normal water level, unless otherwise marked. These luminaires are intended for installation in permanently installed luminaire housings (forming shells) in which the luminaire will be completely surrounded by water in the normal installation. These luminaires are marked to indicate the proper luminaire housing or housings with which they are to be used, and the luminaire housings are marked to indicate the luminaire or luminaires with which the housing is to be used. These luminaires are provided with a factory-installed, permanently attached flexible cord that extends at least 12 feet outside the luminaire enclosure. This permits the luminaire to be removed from the luminaire housing and lifted to the pool or spa deck for servicing without lowering the water level or disconnecting the luminaire from the branch-circuit conductors. Luminaire housings that are intended to be used with luminaires provided with a No. 12 AWG or larger, Type SJ, SJT or SJTO flexible cord are marked for use with 3/4-inch or larger conduit. It is not intended that conduit reducers and conduit with a trade size less than the size accommodated by the threaded hub of the luminaire (fixture) housing be used.

No-Niche Luminaires. These luminaires are intended for permanent installation only in the wall of a swimming pool or a field-fabricated spa, unless accompanying installation instructions describe the option of installation in the bottom of the pool or spa. These luminaires are also intended to be installed with the top of the lens not less than 18 inches below the normal water level, unless otherwise marked. In addition, these luminaires are intended to be mounted to a bracket that is permanently secured in or on the wall where the luminaire will be completely surrounded by water. These luminaires, like wet-niche types, are provided with a factory-installed, permanently attached flexible cord that extends at least 12 feet outside the luminaire enclosure. The luminaires are marked with an identification of the mounting brackets for which they are suitable. The mounting brackets are also marked with an identification of the luminaires for which they are suitable.

Convertible Underwater Luminaires For Aboveground Swimming Pools. These luminaires are initially configured as underwater luminaires for aboveground storable swimming use (see Storable Swimming Pool section). They include provisions for the one-time field conversion of the luminaires to underwater luminaires for aboveground non-storable swimming pool use. Once converted, these luminaires are not suitable for modification back to their original configurations.

Fiber-Optic Underwater Luminaires. These luminaires consist of a lamp/electrical enclosure that is intended to be permanently mounted not less than 5 feet from the pool or spa wall and has a fiber-optic element and associated fittings to transmit the light to the pool or spa. The lamp/electrical enclosure is intended to be installed above the level at which water splashed from the pool or spa or from another source may collect.

Metal Conduit Only. A swimming pool luminaire housing (forming shell) for a wet-niche luminaire and a mounting bracket for a no-niche luminaire that is not provided with a grounding terminal for the supplemental No. 8 AWG grounding conductor that is required when non-metallic conduit is used is marked “CAUTION — For proper grounding use only with metal conduit.”

Orientation, Luminaire. A swimming pool luminaire that depends on its location or position to function correctly is marked to indicate the way it is to be installed or used, unless the position is obvious.

Orientation, Luminaire Housing and Mounting Bracket. If orientation of a swimming pool luminaire housing (forming shell) or mounting bracket is relied upon to orient the luminaire in a position necessary for its intended performance, the luminaire housing or mounting bracket is marked to indicate the position in which it is to be installed.

Underwater Luminaires for Aboveground Non-Storage Swimming Pools. These luminaires are intended only for permanent installation through or on the wall of an aboveground non-storage pool. They are intended to be installed with the top of the lens not less than 8 nor more than 10 inches below the top of the pool wall, unless the luminaire is otherwise marked. They are intended to be permanently connected to the supply with conduit. They may — for installation, maintenance or servicing — employ a maximum 5 feet length of jacketed flexible cord permanently connected between integral components of the luminaire. The installation instructions accompanying a luminaire with a non-enclosed flexible cord describe the method of proper routing and securement of the flexible cord and the method for installation of any guards or structural members to reduce the likelihood of unacceptable stress being imposed on the flexible cord.

Fresh and/or Sea Water Use. Luminaires for swimming pools filled with tap (municipal) or well water, including water that has been salt-treated for chlorine or bromine generation, are marked as suitable for fresh water. Luminaires for swimming pools filled with sea water are marked as suitable for sea water. Luminaires that have been evaluated for both applications may be marked for both.

Submerge Before Lighting. Luminaires that have been investigated for operation only while in contact with water are marked, where visible after installation, “CAUTION — To reduce the risk of electric shock, submerge before lighting”.

Special Markings:

One-Time Thermal Protection. Swimming pool luminaires employing a one-time operation, thermal sensitive device are marked “Out of water operation (for longer than 3 min.) will permanently disable luminaire.” Words in parentheses are optional.

Inoperable Out of Water. Swimming pool luminaires designed to be inoperable when **not** submerged are marked “This luminaire will not light out of water.”

1.5. POTTING COMPOUNDS

General. This Listing covers compounds intended to encapsulate the grounding and bonding conductor splices or terminations in swimming pool and spa equipment such as luminaires, luminaire housings (forming shells) and junction boxes where the splices or termination may be exposed to fresh water pool or fountain water and sunlight for varying lengths of time, including continuous exposure.

These potting compounds are also suitable for use to fill underwater junction boxes. The container or package is marked to identify that they have been evaluated for adhering to stainless steel, copper alloy, and any other materials, if applicable.

Listing Mark. The Listing Mark of Underwriters Laboratories is provided on the smallest unit container in which the product is packaged. The UL Listing Mark includes the product name “Swimming Pool, Fountain and Spa Equipment Conductor Splice Potting Compound.” Any of the three locations — “swimming pool,” “fountain” or “spa equipment” — may be omitted.

As the markings on the smallest unit container are the means by which the authority having jurisdiction determines if the product is UL Listed, the unit container should be retained at the site.

1.6. PUMPS

General. UL Listed pumps include those intended for permanent plumbing for use with permanently installed pools and spas, as well as portable units intended for use with storable pools.

A pump with means for permanent wiring connections or a 3-foot flexible cord and plug, suitable for permanently installed pools is marked:

“This Pump is for Use with Permanently Installed Pools Only — Do Not Use with Storable Pools. A permanently installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage. A storable pool is constructed so that it may be readily disassembled for storage and reassembled to its original integrity.”

Only pumps with this marking should be used with permanently installed pools.

Listing Mark. UL Listing Marks with the product names “Swimming Pool Pump,” “Spa Pump,” or “Swimming Pool or Spa Pump” indicate units suitable for use with swimming pools and spas. A unit for which the name includes “Spa Pump” has also, in addition to the swimming pool pump requirements, been evaluated for use with heated (122°F) water.

Field Installation:

Ground-Fault Protection. Cord-and-plug-connected pumps for use with permanent in or above ground pools or spas are intended to be connected to a circuit protected by a GFCI and are so marked. Each unit is provided with the following marking or equivalent: “WARNING — Risk of electric shock. Connect only to a grounding type receptacle protected by a ground- fault circuit interrupter (GFCI).”

Supply Connection. Unless constructed as indicated below, pumps intended for permanent plumbing connection are provided with means for permanent wiring connections.

Pumps intended for permanent plumbing connection and location at a minimum of 6 feet from the inside walls of a pool or spa may be provided with a 3-foot cord terminating in a grounding-type attachment plug that is the locking type.

Pumps intended for permanent plumbing connection and location at least 10 feet from the inside walls of a pool or spa may be provided with a 3-foot power supply cord with an attachment plug that is *not* the locking type. These units are marked “CAUTION — To reduce the risk of electric shock, install at least 10 feet from the inside walls of a pool. Do not use an extension cord.”

Pumps supplied with a minimum 25-foot cord and attachment plug are intended for use with storable pools only and are so marked. These pumps are not suitable for permanently installed pools (in-ground and aboveground non-storable).

1.7. TRANSFORMERS AND POWER UNITS

General. Products Listed in this category are enclosed transformers and DC output power supplies. They are intended to supply luminaires in fountains, swimming pools, and spas in accordance with Article 680 of the NEC®. The primary rating is 120 volts and the maximum secondary rating is 15 V rms or 30 Vdc and 1 kVA.

Listing Mark. The UL Listing Mark for these units includes by the product names “Fountain Transformer”, “Swimming Pool Transformer,” “Spa Transformer,” or “Fountain, Swimming Pool or Spa Transformer”, “Fountain Power Unit,” “Swimming Pool Power Unit,” “Spa Power Unit,” or “Fountain, Swimming Pool or Spa Power Unit.”

Special Markings:

Swimming Pool Junction Box Use. Unless marked otherwise, these transformers are not suitable for connection to a conduit which extends directly to a wet-niche or no-niche luminaire. Transformers not suitable for this use are to be used with a swimming pool junction box.

1.8. WATER HEATERS

Listing Mark. The UL Listing Mark with the product name “Swimming Pool Heater” or “Spa Heater” indicates suitability for use with permanently installed pools. Gas- or oil- red units are identified by the product names “Gas-Fired Swimming Pool Heater” and “Oil-Fired Swimming Pool Heater”.

Field Installation:

Flow Rate. If a heater is marked with a minimum required water circulation capacity (flow rate), the swimming pool must have pumps with at least that capacity and circuit interlocks that permit heater operation only when the water is being circulated. This flow rate would either be marked on the circulating pump or provided in literature accompanying the pump.

Leakage Current Collectors (Electrical Heaters). If leakage current collectors are not integral to the heater but are provided for field installation, the installation and grounding of the collectors must be exactly as indicated in the installation instructions.

The heater grounding conductor and the leakage current collector grounding conductors should be the same size or larger than the power supply conductors and not smaller than No. 12 AWG.

Outdoor Use. Only heaters marked “Outdoor Use” are suitable for installation outdoors.

Special Markings:

Shutoff Valve. If the heater installation instructions indicate use of a shutoff valve, the heater is marked with its maximum working pressure. The heater is marked to indicate it should be used with a pressure relief valve certified as complying with requirements of either (1) the ASME or (2) ANSI Z21.22, Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems. The heater is also marked to indicate that the pressure relief valve shall have a marked maximum set pressure not to exceed the marked maximum working pressure of the water heater and that the valve inlet should be able to accommodate a 3/4-inch or larger trade size pipe.

1.9. HEAT PUMPS

Listing Mark. The UL Listing Mark with a product name “Swimming Pool Heat Pump,” “Spa Heat Pump,” or “Swimming Pool and Spa Heat Pump” indicates suitability for use with permanently installed pools.

Field Installation:

Outdoor Use. Only heat pumps marked “For Outdoor Use” or the equivalent are suitable for installation outdoors.

1.10. WATER TREATMENT EQUIPMENT

General. Most water treatment equipment is Listed in the category “Water Treatment Equipment” (WDLC). This category includes chlorinators, ozone generators, ion generators, ultraviolet sanitizers and similar equipment intended to sanitize water in pools, spas and hot tubs. It also includes equipment designed to monitor water chemistry in pools, spas and hot tubs. This monitoring equipment may also have the capability of adding chemicals to the water to adjust water chemistry. Ozone generators may also be Classified in the category “Ozone Generators” (WCKA).

The ability of this equipment to sanitize pool and spa water has not been determined. Equipment that has been evaluated for sanitation is Classified in accordance with the requirements of the National Sanitation Foundation Standard Number 50 and can be located under the category (WCNZ) Pool and Spa Equipment Classified in accordance with NSF Standard Number 50”.

Listing Mark. The UL Listing Mark for water treatment equipment other than ozone generators includes the product name “Swimming Pool Chlorinator,” “Spa Chlorinator,” “Swimming Pool and Spa Chlorinator,” or other appropriate product name.

Unique Hazard Considerations. Hazards related to the chemicals generated from chlorinators, brominators, or ion generators are not evaluated by UL as part of Listing or Classification investigations.

1.11. OZONE GENERATORS

Listed Units. Physiological effects of the ozone output of UL Listed units marked “For Outdoor Use Only” have not been evaluated. Listed units marked for indoor use have been evaluated in a standard room installation to determine if any ozone emitted from a test tank is within established limits. Listed units are evaluated to determine that no ozone is emitted from unintended locations of the unit during normal use or abnormal operation such as a blocked output or no flow through a venturi. The Listing Mark for these units has the product identity “Ozone Generator.”

Classified Units. Physiological effects of the ozone output of Classified units have not been evaluated. Classified units are evaluated to determine that no ozone is emitted from unintended locations of the unit in normal use or abnormal operation such as a blocked output or no flow through a venturi.

Classified units are identified by the following Classification Marking on the product:

“OZONE GENERATOR
CLASSIFIED BY UNDERWRITERS LABORATORIES
WITH RESPECT TO RISKS OF ELECTRIC SHOCK,
FIRE AND MECHANICAL INJURY ONLY”

Installation. Ozone generators are not intended for field installation under the skirt of a spa or hot tub, unless the spa is specifically marked for this use.

2. MOTORIZED POOL COVER OPERATORS

2.1. GENERAL

Motorized pool cover operators are covered by the product category “Swimming Pool and Spa Cover Operators, Electric” (WDDJ). They are evaluated for fire, electric shock and mechanical hazards only. Some motorized pool cover operators may incorporate pool covers Classified under the category “Covers For Swimming Pools and Spas” (WBAH). Unless Classified as a power safety cover under the category “Covers For Swimming Pools and Spas,” (WBAH), a cover provided with the operator has not been evaluated as a safety cover.

2.2. LISTING MARK

The UL Listing Mark for these products includes the product name “Swimming Pool Cover Operator,” “Spa Cover Operator” or “Pool Cover Operator.”

3. STORABLE SWIMMING POOLS

3.1. GENERAL

Equipment Listed for use with storable pools includes pumps, Luminaires (Lighting (Fixtures) and water treatment equipment. This equipment is Listed under the product categories of “Pumps” (WCSX) and “Luminaires and Forming Shells” (WBDT), and “Water Treatment Equipment”(WDLC).

3.2. LUMINAIRES (See App. A–Fig. 3)

General. Underwater luminaires for aboveground storable swimming pools are intended for temporary installation only through or on the wall of an aboveground storable pool. UL considers a storable pool to be one that is constructed above the ground and is capable of holding water to a maximum depth of 42 in. (1.07m). These luminaires are intended to be installed with the top of the lens not less than 8 nor more than 10 inches below the top of the pool wall unless the luminaire is otherwise marked. These luminaires are provided with a minimum of 25 feet of jacketed flexible cord, which is intended to be routed away from the pool to the transformer or ground- fault circuit interrupter assembly. The transformer or GFCI assembly is intended to be temporarily mounted to a building or structure and is provided with a minimum 3-foot/ maximum 6-foot power supply cord for connection to the supply source.

Listing Mark. The UL Listing Mark for these products includes the product name “Underwater Luminaire for Aboveground Storable Swimming Pool.”

3.3. PUMPS

Listing Mark. Pumps suitable for this application have a Listing Mark with the product name “Swimming Pool Pump” or “Swimming Pool Pump or Spa Pump.”

Storable Pools Only. The type of pump suitable for use with storable pools has a 25-foot flexible cord and attachment plug. It is marked:

“This Pump is for Use with Storable Pools Only — Do Not Use with Permanently Installed Pools. A storable pool is constructed so that it may be readily disassembled for storage and reassembled to its original integrity. A permanently installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage.

Field Installation:

Double Insulation. Pumps with a minimum 25-foot supply cord are double insulated and have inaccessible metal parts grounded with the equipment-grounding conductor terminated at the attachment plug. These pumps do not have a bonding connector. They are not intended to be connected to an equipotential bonding grid.

Ground-Fault Protection. Pumps for storable swimming pools are provided with a factory installed Class A ground-fault circuit-interrupter. It is an integral part of the attachment plug or in the supply cord within 12 inches of the attachment plug.

3.4. WATER TREATMENT EQUIPMENT

General. UL Listed chlorinators or brominators, as well as Listed or Classified ozone generators, may be used with this equipment. Their limitations are specified in the section titled “PERMANENTLY INSTALLED SWIMMING POOLS.”

4. FIELD CONSTRUCTED SPAS

4.1. GENERAL

This section covers field constructed spas or hot tubs in which separately Listed equipment is plumbed and wired in the field. This equipment includes heaters, blowers, pumps, controls, water treatment equipment, luminaires, heat pumps, transformers and suction fittings. Each is intended to be installed in accordance with the *National Electrical Code*®, NFPA 70, and model building, plumbing, mechanical, fuel gas codes, manufacturer’s instructions, and with provisions detailed in the section following.

A group of the above components may be pre-packaged in a Listed equipment assembly. These assemblies are designed for installation with a field-supplied tub.

4.2. BLOWERS

General. UL Listed blowers are intended for both indoor and outdoor use, unless marked otherwise. Unless otherwise indicated in the installation instructions, blowers should be mounted at least 12 inches above the over flow of a spa or hot tub.

4.3. CONTROLLERS

These are identical to and should be used with the same limitations as those previously specified under “PERMANENTLY INSTALLED SWIMMING POOLS.”

4.4. LUMINAIRES

Luminaires used in this installation are the same as those previously detailed under “PERMANENTLY INSTALLED SWIMMING POOLS.”

4.5. PUMPS

Pumps in this application are essentially identical to those previously discussed under “PERMANENTLY INSTALLED SWIMMING POOLS.” The one exception is the product name accompanying the UL Listing Mark should indicate if the pump is either a “Spa Pump” or “Swimming Pool or Spa Pump.” A pump with a Listing Mark indicating only “Swimming Pool Pump” has not been investigated for use with maximum 50° C (122°F) water.

4.6. SUCTION FITTINGS

General. These units are intended to be provided at all the intake ports of the spa. They have been evaluated to determine that they would not pose a hair entrapment danger when operated at or below their marked flow rates. The maximum flow through the suction fitting should not exceed the marked maximum flow rate of the suction fitting.

4.7. WATER HEATERS

Water heaters can be used with the same limitations described in “PERMANENTLY INSTALLED SWIMMING POOLS.”

4.8. WATER TREATMENT EQUIPMENT

Water treatment equipment can be used in this type of installation in accordance with the limitations previously detailed for water treatment equipment under “PERMANENTLY INSTALLED SWIMMING POOLS.”

4.9. EQUIPMENT ASSEMBLIES

General. Equipment assemblies (“Skid Packs”) are pre-packaged combinations of equipment such as pumps, filters, heaters, blowers, luminaires, and controls. They are intended to be permanently plumbed to a field supplied spa or hot tub using non-metallic piping only. They are designed for indoor or outdoor use and are intended to be installed at least 5 feet from the inside walls of a spa or hot tub.

UL Listed equipment assemblies have not been evaluated for below-grade installation and are not suitable for use within an outer enclosure, or under the skirt of a spa or hot tub, unless so marked.

Listed equipment assemblies that contain a gas- red water heater have not been evaluated for (1) indoor use, (2) use within an outer enclosure, or (3) use under the skirt of a spa or hot tub, unless so marked.

Some equipment assemblies do not contain a heater and, therefore, do not have a water temperature regulating control or water temperature limiting control. Units of this design are intended to have a water heater, a temperature regulating control, and a temperature limiting control provided in the final installation.

Listing Mark. The UL Listing Marks for these products include the following product names, as appropriate:

“Equipment Assembly for Spa/Hot Tub,”
“Hot Tub Equipment Assembly,” or
“Spa Equipment Assembly.”

Field Installation:

GFCI Protection. Cord-connected equipment assemblies have GFCI protection provided. Convertible equipment assemblies have protection provided in the 120-volt configuration. They are protected in the 240-volt configuration, unless marked “Connect To A Circuit Protected By A GFCI When Connected In The 240-volt Mode” or the equivalent. Permanently connected equipment assemblies may or may not have integral GFCI protection. If not, the installation instructions indicate the unit should be connected to a circuit protected by a GFCI. If integral GFCI protection is provided, it protects all circuits.

Disconnecting Means. A convertible or permanently connected unit may be additionally provided with an integral disconnecting means not intended to substitute for that required by NEC® section 680.12.

Suction Fittings. To reduce the risk of hair and body entrapment, equipment assemblies are intended for use with a UL Listed suction fitting, the flow rate of which meets or exceeds the flow rate marked on the equipment assembly. Each equipment assembly is marked with “WARNING — PREVENT DROWNING”

1. Supervise children at all times. 2. Attach spa cover after each use. Install a suction fitting with a marked flow rate of not less than ___ gallons per minute.” In this case, the ___ is filled in by the manufacturer with the gallons per minute flow rate of the assembly.

Supply Connection. These units may be designed for either permanent wiring or connection with a flexible cord and plug. They may also be designed for field convertibility from a 120-volt cord connected configuration to a 240-volt permanently wired configuration only. The electrical rating includes the minimum supply conductor ampacity and the ampere rating of the supply conductor overcurrent protective device.

Underwater Lighting Circuit. Equipment assemblies that have terminals on the load side of a ground-fault circuit interrupter, which protects field-installed conductors of an underwater lighting circuit, are specially marked. The markings indicate that the field-installed conductors shall not occupy conduit, boxes or enclosures with conductors of other circuits, unless all other conductors are also on the load side of a ground-fault circuit interrupter. Suitable segregation or isolation of the circuits is maintained within the equipment.

Special Markings:

Multiple Disconnects. If more than one disconnect switch is required to disconnect all power to a unit, the unit is marked — in a place readily visible to service personnel prior to disconnecting the main supply for the unit — with the word “WARNING” and the following or equivalent, “PREVENT ELECTROCUTION — Disconnect all supply connections before servicing. This appliance has _____ supply connections.”

5. SELF-CONTAINED SPAS

5.1. GENERAL

This section covers self-contained spas for aboveground use, for household or commercial

use, and for indoor and outdoor use, unless marked otherwise. Spas are not designed or intended to be drained after each use. They are intended for installation in accordance with Article 680 of the *National Electrical Code*®, NFPA 70 and model building, plumbing, mechanical, fuel gas codes, and the manufacturer’s installation instructions.

Units come in three basic designs:

1. Most units are shipped completely assembled from the factory and require only supply connection in the field.
2. Some units, referred to as “Knockdown” spas, are types for which a spa shell, equipment assembly and skirt are shipped separately. The shell and equipment assembly are plumbed at the factory and connected together in the field with threaded unions.
3. Additional units, referred to as “Modular” spas, are similar to “Knockdown” units except they are plumbed in the field. All parts are provided and pre-cut, if needed, and accompany applicable instructions and accessories such as polyvinyl chloride (PVC) solvent. They are intended for assembly by untrained users and the suitability of all interconnections and wiring is to be determined by authorities having jurisdiction.

“Modular” or “Knockdown” designs are accompanied by detailed assembly instructions and have identifying markings on each sub-assembly. The names or model numbers are specified in the assembly instructions so the user can correctly assemble the unit and the inspection authority can determine that the unit was assembled using the correct parts.

5.2. LISTING MARK

The UL Listing Mark includes the product name “Self-Contained Spa.”

5.3. FIELD INSTALLATION:

Branch-Circuit Protection. A permanently-wired spa intended to be protected by a branch-circuit overcurrent device rated less than the maximum rating of the branch-circuit overcurrent device permitted by the NEC® is marked to indicate the maximum rating of the branch-circuit overcurrent device for which the unit has been investigated and found acceptable. The electrical rating includes the minimum supply conductor ampacity and the ampere rating of the supply conductor overcurrent protective device.

Gas-Fired Heaters. Self-contained spas may be provided with gas fired heaters. Spas with gas-fired heaters are intended for permanent wiring and permanent installation, and unless otherwise marked, are intended for outdoor use only.

Options. The installation instructions of self-contained spas may indicate options such as lighting kits, blowers, additional pumps or ozone generators. These option kits are only to be used in spas with installation instructions that indicate the spas are factory-wired to accommodate them.

Supply Connection. Self-contained spas may be cord-connected, convertible or permanently wired. A convertible spa is shipped from the factory with a power supply cord but is designed for field conversion to a permanently wired configuration, either 120-volt, 240-volt or both. Once a convertible spa is converted to permanently wired, it is not intended to be returned to a cord-connected configuration.

Ground-Fault Protection. Cord-connected spas have GFCI protection provided. Convertible spas have protection provided in the 120-volt configuration. They are also protected in the 240-volt configuration, unless marked “Connect To A Circuit Protected By A GFCI When Connected In the 240-volt Mode,” or equivalent. Permanently connected spas may or may not have integral GFCI protection. If not, the installation instructions indicate the unit should be connected to a circuit protected by a GFCI. If integral GFCI protection is provided, it protects both 120-volt and 240-volt circuits.

5.4. SPECIAL MARKINGS:

Spa Caution Marking. To help reduce the risk of electric shock from other electrical appliances used near the spa, each unit is marked “WARNING” — Risk of Electrical Shock. Do not permit any electrical appliance (such as a light, telephone, radio, or television) within 5 feet of this spa.”

6. HYDROMASSAGE BATHTUBS

6.1. GENERAL

This section includes UL Listed indoor hydromassage bathtubs (whirlpool bathtubs) for residential or commercial use. They are intended for permanent connection to the building plumbing. The hydromassage bathtub consists of a drainable tub and a water or air pump, and may include other equipment such as a luminaire, control, air blower, heater or suction fittings. These units are intended to be drained after each use. These units are not intended to be field assemblies of Listed parts. Although they may include a Listed swimming pool or spa pump, the entire unit — consisting of shell, pump and any other related electrical components — is evaluated and Listed as a complete appliance. The pump is not intended to be installed away from the tub.

6.2. LISTING MARK

These Listings appear in the Electrical Appliance and Utilization Equipment Directory (Orange Book and online at www.ul.com/database). The Listing Mark for this category contains the product name “Hydromassage Bathtub.” The Listing mark for heaters intended to be installed after the bathtub leaves the factory contains the product name “Hydromassage Bathtub Accessory”.

6.3. PLUMBING ASSESSMENT

UL Listed hydromassage bathtubs may also be Classified to either the water retention requirements or all requirements of ASME/ANSI A112.19.7 - +. The combined Listing Mark/Classification marking consists of the Listing Mark described at the beginning of this section and the following marking: “Also Classified by Underwriters Laboratories in accordance with “*,” where “*” is one of the statements detailed below:

1. “ANSI A112.19 - +”
2. “Water Retention Test requirement from ANSI A112.19.7 - +”

+ issue date of Standard or latest addendum.

6.4. FIELD INSTALLATION:

Supply Connection. Most units are intended for permanent connection to the branch circuit. Bathtubs may be provided with a factory- installed maximum three-foot length of jacketed flexible cord terminating in an attachment plug.

Branch-Circuit Protection. A unit intended to be protected by a branch-circuit overcurrent device rated less than the maximum rating of the branch-circuit overcurrent device permitted by the NEC® is marked to indicate the maximum rating of the branch-circuit overcurrent device for which the unit has been investigated and found acceptable.

Factory Configuration Information. Each hydromassage bathtub is provided with a marking on the wiring diagram, in the installation instructions or on a separate configuration sheet, to identify the factory-installed components of the unit. These components include pumps, controls, heaters, luminaires, and supply cords. The configuration marking and the installation instructions are intended to be available during installation and inspection.

Ground-Fault Protection. Whether they are permanently wired or use a cord and plug, these units are intended to be protected by a ground-fault circuit interrupter. Each unit is plainly marked with the following or equivalent statement: “Connect only to a circuit protected by a ground-fault circuit interrupter (GFCI).”

Multiple Supply Sources. A hydromassage bathtub may have provision for a maximum of two supply sources. If the unit is cord-connected, each single source must be an individual branch circuit rated not more than 20 amperes. Units requiring more than one disconnect switch to disconnect all power are provided with a marking warning to this effect.

Options. Hydromassage bathtubs may have option kits indicated in the installation instructions. These typically include blowers, heaters or luminaire assemblies. Hydromassage bathtubs intended for heaters to be installed after the bathtub leaves the factory are factory configured with a fitting to be removed and replaced by the heater. These units are marked “Suitable for Field-Installed Heater Accessory” and “Use only Accessory Heaters Marked for Use With This Bathtub.” Bathtubs not factory-configured for a field-installed heater are marked “Not Suitable for Field-Installed Heater.”

7. FOUNTAINS

7.1. GENERAL

This section covers fountains with UL Listed equipment assembled and connected in the field. Electrical products for use in fountains are Listed under the following categories: “Pumps, Motor-Operated Water” (REUZ), “Plumbing Accessories” (QMTX) and “Submersible Luminaires (Fixtures)” (IFEV), “Pumps” (WCSX) and “Industrial Control Panels” (NITW) (identified as fountain control panels).

7.2. SUBMERSIBLE LUMINAIRES

General. Products Listed in this category include submersible luminaires and submersible junction boxes. Submersible luminaires for use in fountains are not suitable for use in vessels intended for partial or complete immersions of persons.

Listing Mark. UL Listed submersible luminaires and junction boxes for use in fountains have a Listing Mark with the product names:

“Mounting Bracket for No-Niche Luminaire (Fixture),”
“Housing for Wet-Niche Luminaire (Fixture),”

“Submersible Luminaire (Fixture) Wet-Niche Type,”
“Submersible Luminaire (Fixture) Dry-Niche Type,”
“Submersible Luminaire (Fixture) No-Niche Type,”
“Submersible Luminaire (Fixture) Special Use,” or
“Submersible Junction Box.”

Field Installation:

Dry-Niche Submersible Luminaire. This luminaire type is intended for permanent installation only in the wall of built-in fountains, unless accompanying installation instructions describe additional option of installation in the bottom of the fountain. These luminaires are designed for servicing from the rear through a passageway behind the fountain wall or, if mounted in the bottom of the fountain, in a tunnel underneath the fountain. For the purposes of installation, maintenance or servicing, the luminaire may include a factory-installed length of flexible cord terminating in an attachment plug. A receptacle outlet assembly for connection of the attachment plug to the branch-circuit may be provided as an integral part of the niche included with the luminaire.

Wet-Niche Submersible Luminaire. These luminaires are intended to be installed in the wall of built-in fountains, unless accompanying installation instructions describe additional option of installation in the bottom of the fountains. They are intended for installation in a permanently installed luminaire housing (forming shell) in which the luminaire will be completely surrounded by water. These luminaires are marked to indicate the proper luminaire housing or housings with which they are to be used. Luminaire housings are marked to indicate the luminaire or luminaires with which the luminaire housings are to be used. These luminaires are provided with a factory-installed, permanently attached flexible cord that extends at least 12 feet outside the luminaire enclosure to permit the luminaire to be removed from the luminaire housing and lifted to the fountain deck for servicing without lowering the water level or disconnecting the branch-circuit conductors. Luminaires with longer cords are available for installations with a junction box or splice enclosure located where a longer cord is necessary to permit luminaire removal from the luminaire housing and placement on the deck for servicing.

No-Niche Submersible Luminaire. These luminaires are intended to be installed on the walls of built-in fountains, unless accompanying installation instructions describe the additional option of installation in the bottom of the fountains. These luminaires are to be mounted to a bracket and permanently secured in or on the wall, with the luminaire completely surrounded by water. These luminaires are provided with a factory installed, permanently attached flexible cord that extends at least 12 feet outside the luminaire enclosure. The cord is intended to function similarly to those provided with a wet niche type luminaire. The luminaires are marked with an identification of the mounting bracket for which they are suitable. The mounting brackets are also marked with an identification of the luminaires for which they are suitable.

Submersible Luminaire Special Use Type. These luminaires are intended to rest directly on the fountain or on other surfaces within the perimeter of the fountain. The luminaires are provided with a permanently attached flexible cord intended to terminate in a submersible junction box or to be routed out of the fountain through conduit to a junction box.

Metal Conduit Only. A submersible luminaire housing (forming shell) that does not have a

grounding terminal is marked “CAUTION — For proper grounding use only with metal conduit.”

Orientation, Luminaire. A submersible luminaire that depends on its location or position to function correctly is marked to indicate the way it is to be installed or used, unless the position is obvious.

Orientation, Luminaire Housing and Mounting Bracket. If a submersible luminaire housing (forming shell) is relied upon to orient the luminaire in a position that is necessary for its intended performance, the luminaire housing or mounting bracket is marked to indicate the position in which it is to be installed.

Submerge Before Lighting. Luminaires that have been investigated for operation while submerged under water are marked “Submerge Before Lighting” or the equivalent, and such a marking must be visible after installation of the luminaire. +

7.3. SUBMERSIBLE PUMPS

These are UL Listed under the product categories of “Plumbing Accessories” (QMTX) or “Pumps, Motor-Operated Water” (REUZ). The Listing Mark product name is “Submersible Pump” or equivalent. These pumps have not been investigated for use with or in proximity to swimming pools or spas.

7.4. CONTROL PANELS

Control panels intended for use with floating or permanent architectural fountains are UL Listed under the Product category “Industrial Control Panels” (NITW). The control panel nameplate includes the marking “Industrial Control Panel for Floating Fountain” or “Industrial Control Panel for Permanently Installed Fountain” or “Fountain Control Panel”

8. COVERS FOR SWIMMING POOLS AND SPAS

8.1. GENERAL

This section covers swimming pool and spa safety covers, including both manually and power-operated types. Also included are special-purpose covers such as energy conservation or solar energy covers.

Manual safety covers are intended to impede access to the contained body of water. They are provided with means for removing significant levels of collected surface water.

Power safety covers are barriers that can be placed over the water area and are removed with a motorized mechanism. They are intended to impede access to the contained body of water. A power safety cover includes an operator that is Listed under the category “Swimming Pool and Spa Cover Operators, Electric” (WDDJ).

Other types of covers such as energy conservation or solar energy covers are not intended to impede access to the contained body of water. Such covers are marked “This Is Not A Safety Cover.”

8.2. CLASSIFICATION MARKING

The Classification marking for these products includes the names “Manual Safety Cover,”

“Power Safety Cover” or “Pool Cover.”

9. SUCTION FITTINGS

9.1. General

This category covers suction fittings intended for use in swimming pools, wading pools, in-ground and self-contained spas, hot tubs, and similar installations. These fittings have been investigated for resistance to hair, body, finger and limb entrapment. Suction fittings have been investigated for both indoor and outdoor use. They are intended to be installed following the instructions that are packaged with each fitting.

9.2. Ratings

Each suction fitting is marked with a water flow rate in gallons per minute. This rate must equal or exceed the maximum flow rate of the pump(s) used in the water circulating system.

9.3. Installation Markings.

These fittings are marked with the intended installation position: "Wall Only", "Floor Only" or "Wall or Floor." They may additionally be marked with the statement, "For Single or Multiple Drain Use", "For Single Drain Use" or "For Multiple Drain Use Only." Units marked "For Multiple Drain Use Only" are intended for installations with at least two fittings per return. The fittings are intended to be installed in accordance with local installation codes so that it is unlikely both could simultaneously be blocked.

9.4. Listing Mark.

The Listing Mark for these products includes one of the following product names: "Swimming Pool Suction Fitting" (or "Sw Pool Sctn Ftn").

10. SPEAKERS

10.1 General

The category UEAY (Speakers) covers underwater speakers.

10.2 Listing Mark.

The Listing Mark for these products includes the product name “Underwater Speaker”.

APPENDIX A

Schematic Diagrams for Luminaire Installations

Fig. 1 - Underwater Luminaire for aboveground non-storable swimming pool.

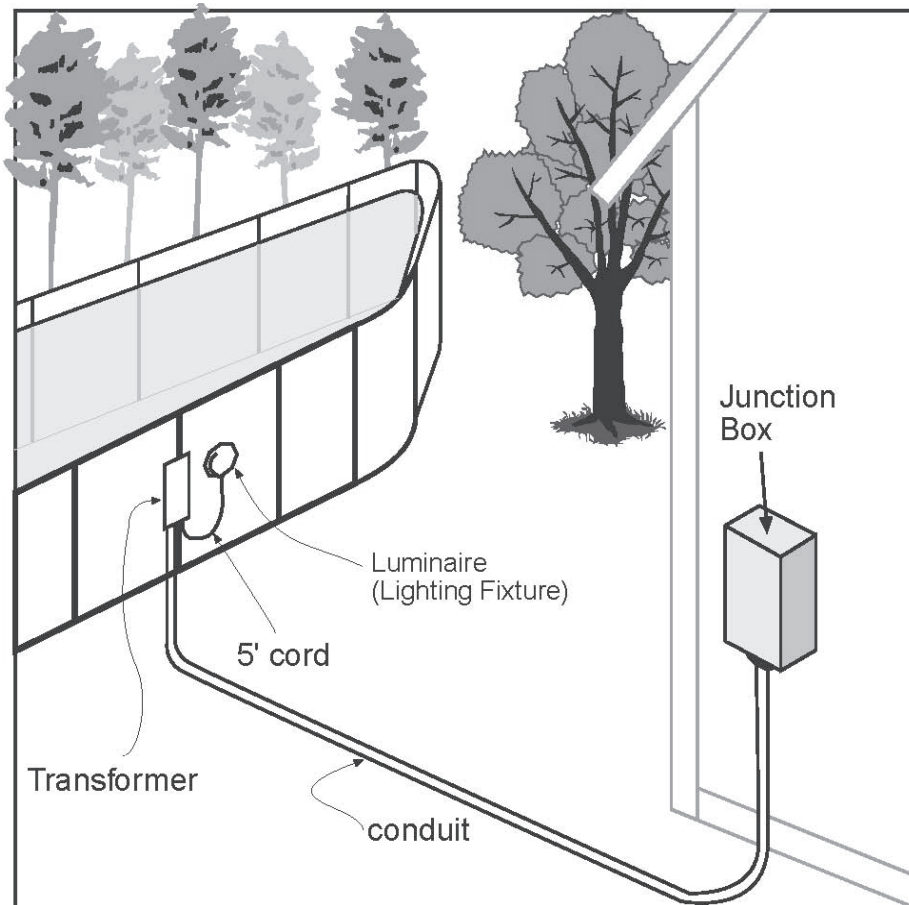


Fig. 2 - Underwater Luminaire for aboveground non-storable swimming pool.



Fig. 3 - Underwater Luminaire for aboveground storage swimming pool.

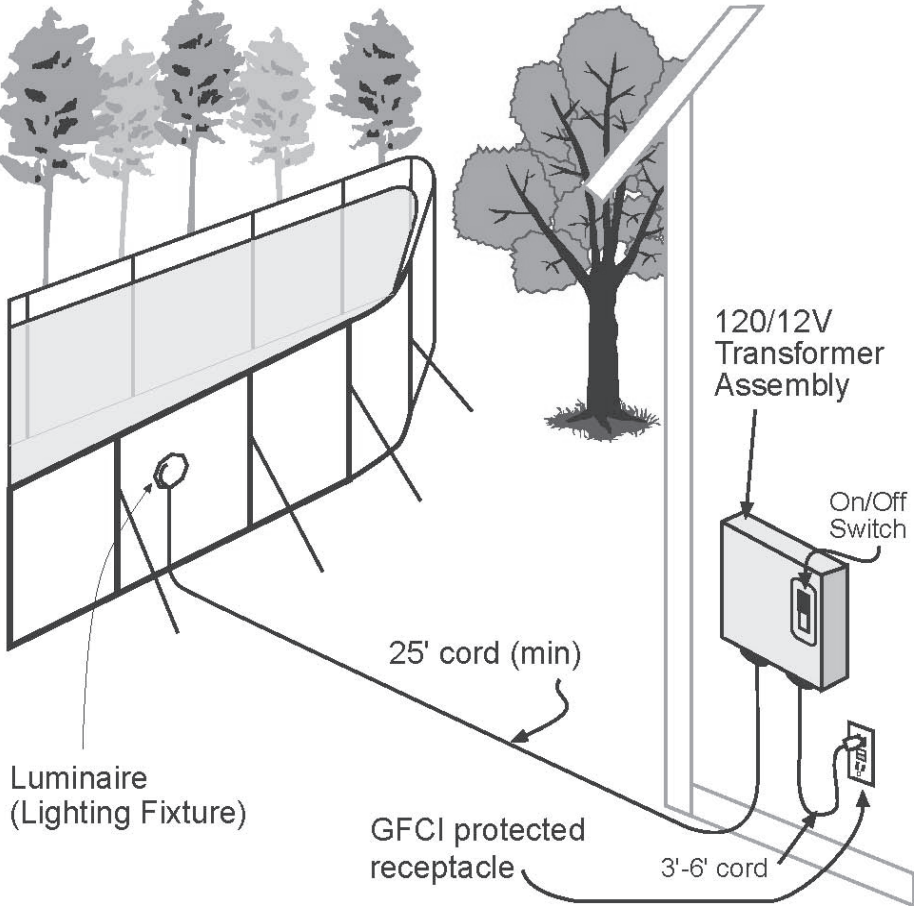


Fig. 4 - No-Niche Underwater Luminaire.

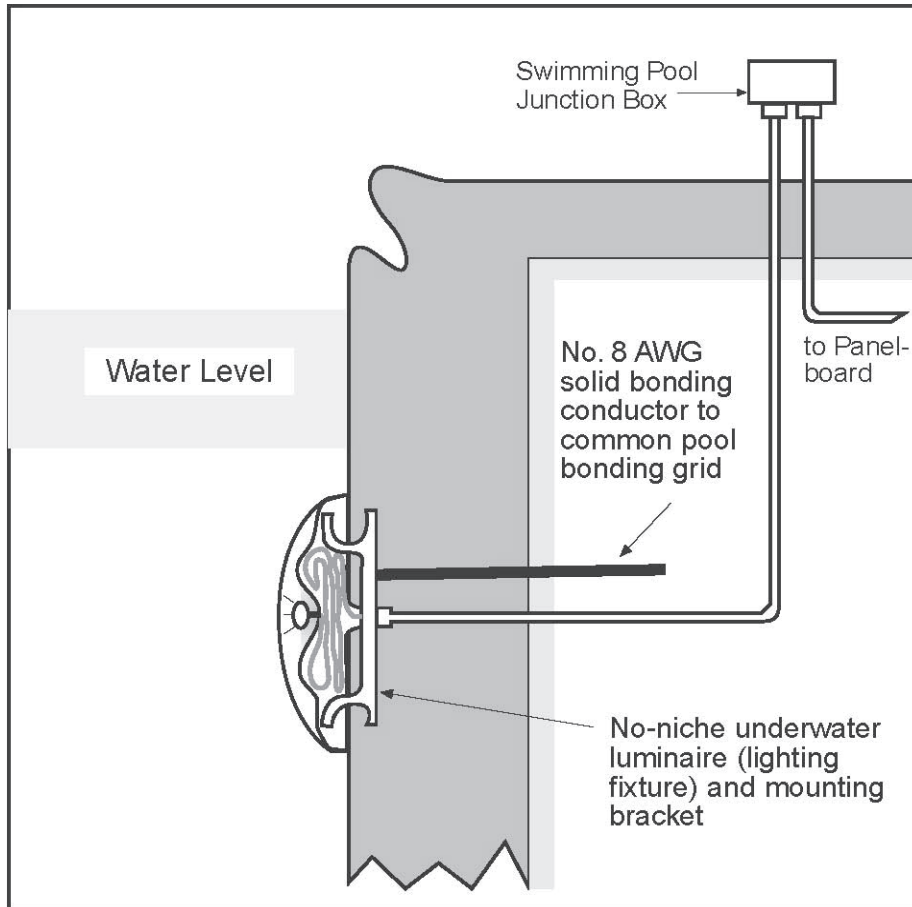
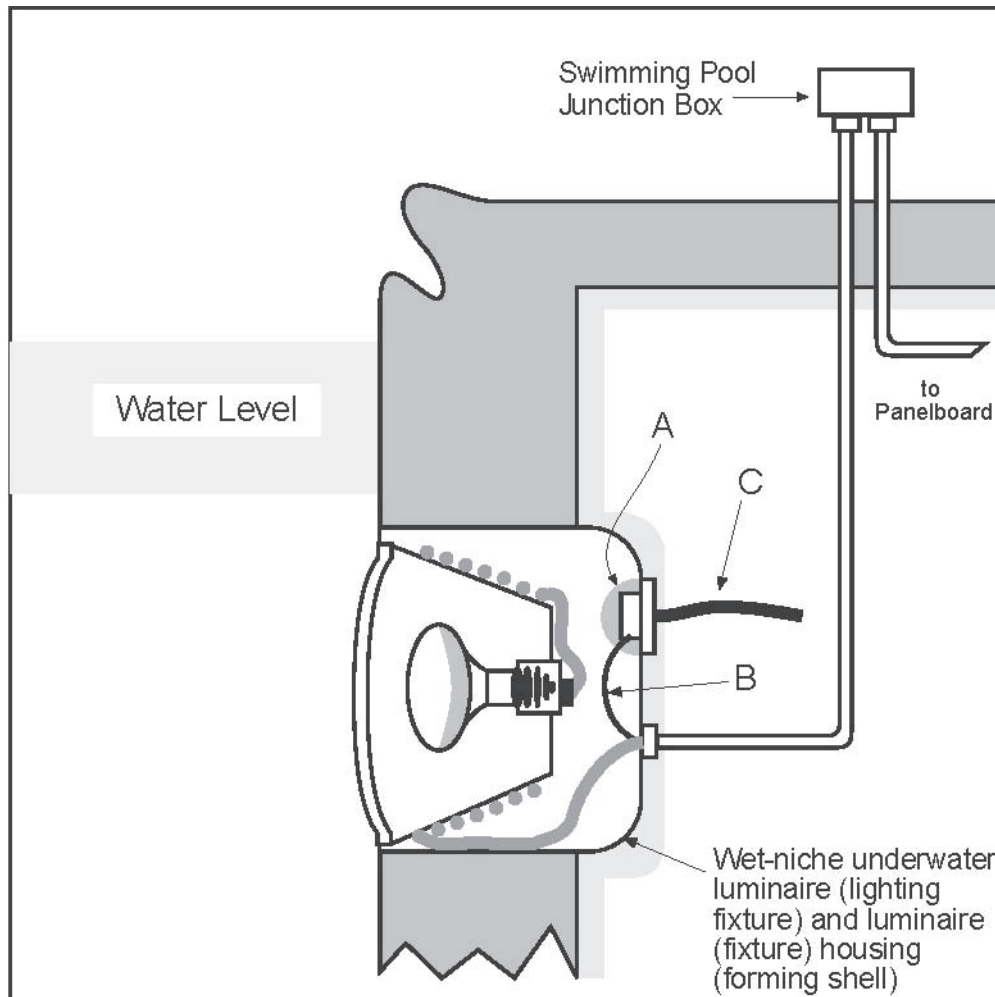


Fig. 5 – Wet-Niche Underwater Luminaire.



- A. UL Listed swimming pool potting compound encapsulating supplemental equipment grounding conductor terminal.
- B. No. 8 AWG insulated supplemental equipment grounding conductor where nonmetallic conduit used.
- C. No. 8 AWG solid bonding conductor to pool common bonding grid.

**APPENDIX B:
UL SWIMMING POOL, SPA, FOUNTAIN, AND HYDROMASSAGE BATHTUB PRODUCT
CATEGORIES**

UL does list this type of equipment and continues to develop new product categories to address the safety issues associated with this type of equipment. Below is a list of product categories that UL currently lists to address these types of products. Each product category is tabulated with a UL Category Code. By clicking on the code, you will be linked to the UL Guide Information for the category and any Listings or Classifications under that Product Category in the UL Online Certifications Directory database at www.ul.com/database.

Category Code	Category Name	Standard Used
WABX	Swimming Pool and Spa Equipment	
WAGN	Blowers	UL 1563
WAWU	Controls	UL 1563
WBAH	Covers for Swimming Pools and Spas	ASTM F1346
WBRR	Heaters	UL 1261
WBYQ	Hot Tub and Spa Equipment Assemblies	UL 1563
WCEZ	Junction Boxes	UL 1241
WBDT	Luminaires and Forming Shells	UL 676
LSHW	Oil-Fired Swimming Pool and Spa Heaters	UL 726 and UL 1563
WCKA	Ozone Generators	UL 1563
WCNZ	Pool and Spa Equipment Classified in Accordance with NSF 50	ANSI/NSF 50
WCRY	Potting Compounds	UL Subject 676A
WCSX	Pumps	UL 1081
UDGJ	Residential Water Hazard Entrance Alarms (pool alarms)	UL 2017
WCZW	Self-Contained Spas	UL 1563
UEAY	Speakers	UL 1480
WEBS	Suction Fittings for Swimming Pools, Wading Pools, Spas and Hot Tubs	ANSI/ASME A112.19.8 ANSI/APSP 16
WDDJ	Swimming Pool and Spa Cover Operators, Electric	UL Subject 2452
WDUT	Swimming Pool and Spa Equipment, Miscellaneous	UL 1563 and UL 1081
WDGV	Swimming Pool and Spa Transformers	UL Subject 379
WDLC	Water Treatment Equipment	UL 1081, UL 1563
	Fountains and Fountain Equipment	
AWEG	Architectural and Floating Fountains	UL 778, UL 676, UL 508 ^A
QMTX	Plumbing Accessories	UL 1951
REUZ	Pumps, electrically operated, liquid	UL 778
IFEV	Submersible Luminaires	UL 676
	Hydromassage (Whirlpool) Bathtubs	
NCHX	Hydromassage Bathtubs	UL 1795, ASME A112.19.7
PIDF	Medical Electrical Equipment, Professional (hydrotherapy tubs)	UL 60601-1

APPENDIX C: POOL AND SPA CODES AND STANDARDS

Pool and spa equipment must be installed in accordance with model codes and installation standards. These codes require these products to be listed and labeled in accordance with applicable product standards.

UL standards are typically identified as Standards for Safety and cover reasonably foreseeable risks associated with a product. Limitations applicable to the products covered by the standard are delineated in the Scope section of the standard. UL standards are intended to:

- Identify requirements for evaluation of products and provide consistency in the application of these requirements.
- Provide guidance for development of products by manufacturers.
- Provide requirements compatible with nationally recognized installation codes

An UL Outline of Investigation is a document that contains the construction, performance, and marking criteria used by UL to investigate a product when the product is not covered by the scope of an existing UL Standard for Safety. Outlines are not consensus documents and do not require review by an UL Standards Technical Panel (STP) or other external group.

ANSI/ASME A112.19.7	Requirements for Whirlpool Bathtub Appliances
ANSI/ASME A112.19.8	Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs
ANSI/APSP 16	Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs
ASTM F1346	Standard Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs
IBC	International Building Code
IFGC	International Fuel Gas Code
IMC	International Mechanical Code
NFPA 54 (NFGC)	National Fuel Gas Code
NFPA 70 (NEC)	National Electrical Code
NSF/ANSI 50	Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs
UL Subject 379	Outline of Investigation for Transformers for Fountain, Swimming Pool, and Spa Luminaires
UL 508A	Industrial Control Panels
UL 60601-1	Medical Electrical Equipment
UL 676	Underwater Lighting Fixtures
UL Subject 676A	Outline of Investigation for Potting Compounds for Swimming Pool, Fountain, and Spa Equipment
UL 726	Oil-Fired Boiler Assemblies
UL 778	Motor-Operated Water Pumps
UL 1081	Swimming Pool Pumps, Filters, and Chlorinators
UL 1241	Junction Boxes for Swimming Pool Luminaires
UL 1261	Electric Water Heaters for Pools and Tubs
UL 1480	Speakers for Fire Alarm, Emergency, and Commercial and

	Professional Use
UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment
UL 1795	Hydromassage Bathtubs
UL 1951	Electric Plumbing Accessories
UL 2017	General-Purpose Signaling Devices and Systems
UL Subject 2452	Outline of Investigation for Electric Swimming Pool and Spa Cover Operators
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
USEC	Uniform Solar Energy Code
USPSHTC	Uniform Swimming Pool, Spa, and Hot Tub Code



Marking and Application Guide

WIRE AND CABLE

JANUARY 2013

Wire and Cable
Marking and Application Guide

PREFACE

Each year, millions of feet of wire and cable are installed in all types of buildings and are subjected to many different environmental conditions. Because of the choices available, it is important to know which wiring is suitable for a specific situation. It is also important to be able to properly identify these locations. Markings on or associated with the product, the UL Listing, Classification, or Verification information, and requirements in the current edition of the National Electrical Code® all convey the information needed to ensure a compliant installation.

This publication explains markings found on UL Listed, Classified, or Verified wire and cable.

UL has developed this guide for use by code and inspection authorities, electric utilities, contractors, installers, users, designers, and other interested parties to aid in understanding the markings found on wire and cable, and the applicable codes and standards in order to facilitate a reasonably safe and code-compliant installation.

Although they may be broadly worded, required or optional product markings (and their locations) are specific to the product with which they are associated. This document is intended to be used in determining the suitability of a particular UL Listed, Classified, or Verified wiring product that complies with all the applicable UL requirements, in a particular application.

UL Marking and Application Guides are updated as necessary due to new product development, changes in the codes, or the need for clarification. To confirm the current status of any UL Marking Guide, please consult the Code Authorities page of the UL Web site at www.ul.com/codeauthorities.



Your comments or suggestions are welcome and appreciated. They should be directed to:

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Wire and Cable
Marking and Application Guide

INTRODUCTION

This guide is intended to assist installers, contractors, and authorities having jurisdiction in determining the suitability of UL Listed, Classified, or Verified wire and cable for use in a specific installation. Toward this goal, the guide:

- a) Clarifies the means used to identify UL Listed, Classified, or Verified wire and cable (see the sections titled "Identification of Listed Products", "Identification of Classified Products," "Identification of Verified Products).
- b) Provides an explanation of the ratings and intended uses of UL Listed, Classified, or Verified wire and cable (see Appendix A for designations).
- c) Focuses on the information contained in UL Listed, Classified, or Verified wire and cable product markings (what the markings mean, where they may be located, etc.).

This guide does not address wire and cable evaluated only for suitability as factory-installed component wiring in other Listed equipment. Those products are Recognized by UL under the Component-Appliance Wiring Material (AWM) and Component-Nonshielded cable categories and are not identified with an NEC[®] wire Type designation.

In general, Component Wire or Cable is not evaluated for field installation unless it is included as a part of a complete, Listed product or system. For example, data processing equipment Listed under the Information Technology Equipment Including Electrical Business Equipment (NWXG) category will use external interconnect cables, such as AWM Style 2464, only if the AWM has been evaluated and described in the Listing for the particular piece of equipment. The limitations on the installation of the Listed end-use product or system also apply to the wiring. Some interconnect cables may have connectors assembled on one or both ends as a computer-interconnection assembly. When these assemblies use Recognized cable and are sent to a building site separately, instead of being supplied with the equipment, these cable assemblies may be identified as Listed Computer Interconnection Cable Assemblies (DVPJ). Similarly, for communication equipment, Listed Communication Cable Assemblies (DUNH) may be used. AWM ratings and conditions of acceptability are shown on a tag affixed to the reel or carton. Some ratings may appear on the surface of the wire or cable.

The UL label is required for Listed, Classified, and Verified wire and cable products and can be applied in various manners. It can be applied to a coil, reel, flange, or box.

The UL Mark appearing on the coil, reel, flange, or box is the only means to identify wire/cable covered under UL certification and Follow-Up Service. The UL symbol or letters "UL" surface printed on the wire/cable is only a supplemental method of marking the product and should not be considered as evidence of UL coverage. UL's Guide Information located in the Online Certification Directory will indicate if the UL symbol or letters on the wire/cable itself is required or permitted. Engineering markings, which appear on the wire/cable are only intended to provide information related to the product's ratings or testing scope.

This guide should be particularly useful for those who:

- a) Have a working knowledge of the current edition of the National Electrical Code® (NEC®) and how locally applicable electrical codes relate to the NEC®.
- b) Are already familiar with the requirements of the electrical installation under consideration.
- c) Can identify the cable as a particular type.

This guide is intended to supplement the Guide information for the appropriate wire and cable categories in the UL White Book and the NEC®. The UL Category Code for each wire and cable category is identified in Tables 1, 2, and 3 of this Marking Guide.

1. HOW TO USE THIS GUIDE

The wire and cable types covered in this guide have been divided into three tables as follows:

Table 1 — Building Wires and Cables, including some industrial cables

Table 2 — Low Voltage Cables, Flexible Cords, and Fixture Wires

Table 3 — Special Purpose Wire and Cable

In each table, wire and cable types are identified by the name of the category under which they appear in the UL White Book. Most wire and cable types have the same category designation in the NEC® as they do in the UL White Book.

Definitions of the column headings and codes used in each column are provided in the section titled “Explanations and Notes for Marking Tables.” Table entries consist of:

Table Entry	Indicates
Yes	The wire or cable is always evaluated for the use specified by the particular column. These uses are explained in the section titled “Explanations and Notes for Marking Tables.”
— (dash)	The wire or cable is not evaluated for the indicated use, either as a requirement or as an option.
Numbers	A specific rating. For example, 250 in the column headed by “Temperature (°C) Dry” indicates a 250°C temperature rating for dry locations.
Numbers in parentheses e.g., (3), (21)	Specific notes detailing a rating and/or associated marking. The explanations of the notes can be found in “Explanations and Notes for Marking Tables,” following the tables.

2. IDENTIFICATION OF LISTED PRODUCTS

The UL Mark may have various information around it as authorized by Underwriters Laboratories.



The Listing Mark of Underwriters Laboratories on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated above) together with the word “LISTED,” a serial number, and the product or category name.

A product bearing the UL Mark for Canada is Listed to Canadian Standards for that specific product. A product bearing the combined Canada/U.S. Mark is Listed to both UL’s (U.S.) Standards and Canadian Standards for that specific product.

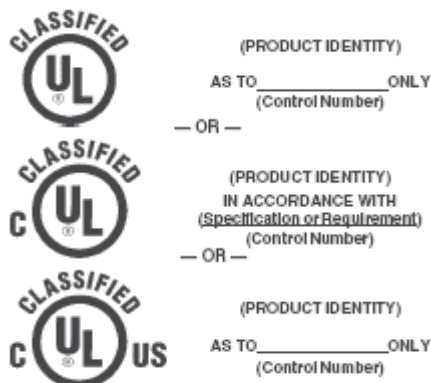
For wire and cable products, the complete Listing Mark is located on a tag attached to the reel or smallest unit container. Two types of UL symbols — “UL” in a circle or “UL” in parentheses — may be found on the wire or cable itself. These UL symbols may also be preceded by the letter “C”, indicating certification only for Canada, or preceded by a “C” and followed by “US”, indicating certification for both the US and Canada. The product markings are intended to provide information only, and the complete Listing Mark is the only proof that a particular unit of wire or cable is actually Listed.

To provide consistent control and marking, and to address potential counterfeiting issues, Holographic labels are required on all Listed, Flexible Cords and Cables, Communications cable, Communications cable verified to UL Performance Category Program, Data transmission cable verified in accordance with national or international specifications, Community antenna television cables, Data processing cable, Non-power-limited fire-alarm cable, Power-limited fire alarm cable, Instrumentation tray cable, Network powered broadband communications cable, Optical fiber cable and Power-limited circuit cable.

3. IDENTIFICATION OF CLASSIFIED PRODUCTS

With UL’s Classification Service, UL determines that a manufacturer has demonstrated the ability to produce a product that complies with its requirements for the purpose of classification or evaluation regarding one or more of the following: (1) specific risks only, such as casualty, fire or shock; (2) performance under specified conditions; (3) regulatory codes; (4) other standards, including international and regional standards; or (5) other conditions UL may consider desirable. UL conducts a Follow-Up Service as an audit of the means the manufacturer uses to determine continued compliance of the product with UL’s requirements. The UL Classification Marking may appear in various forms as authorized. The Classification Marking includes: (1) the symbol of Underwriters Laboratories – ; (2) the word “CLASSIFIED”; (3) a product identity and a statement

to indicate the extent of UL’s evaluation of the product such as “AS TO (nature of hazard) ONLY,” or a rating or classification as specified in the general information pertaining to the product category, or designation and title of standard published by other organization, or identification of specified product; and (4) a control number assigned by UL.



4. IDENTIFICATION OF VERIFIED PRODUCTS

The UL Verification Mark is used to identify products evaluated under UL’s Performance Verification Services. Some examples are products tested under the UL Performance Verification program for cable, Levels XP Structured Cabling Program, Proprietary Structured Cabling Program, ISO/IEC 11801, ANSI/TIA 568C.2, and NEMA.

The presence of this mark provides assurance to end-users, IT managers, LAN system designers, and the regulatory community that products have been evaluated for transmission performance, in order to meet the unique needs of the telecommunications industry community.

There are two formats to the Verification Mark (holographic label) that appear on products: Listing and Verification (as shown in Illustration A below) and Verified-Only (as shown in Illustration B below).

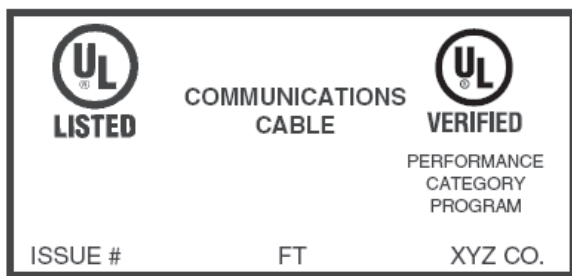


Illustration A

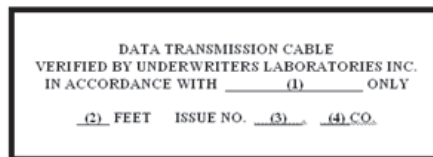


Illustration B

Listed cable also tested under the UL Performance Verification Program for cable in accordance to ANSI/TIA 568C.2 have the label marking “Listed Communications Cable” also “Verified to UL Performance Category Program,” on the tag, reel or smallest unit container, as shown in Illustration A. Cable Verified to another transmission performance specification, (NEMA WC63, 63.1, 66, ISO 11801, etc.), have the label marking “Listed Communications, Cable” also “Verified

in Accordance with [Specification name and/or number]" on the tag, reel or smallest unit container. In addition, surface marking on these products would be as follows:

- 1) For performance Category Cable: "Verified (UL) Category 3, 5, 5E, 6 or 6A [including latest draft number if applicable].
- 2) For performance Category Patch Cable: "Verified (UL) Category 3, 5, 5E, 6 or 6A [including latest draft number if applicable] Patch Cable" for stranded conductor cables.
- 3) For all other Performance Verified Cable: "Verified in Accordance with [Specification name and/or number]"

Cabling products that are Verified Only (Non-UL Listed) will use the label as shown in Illustration B. The UL Logo (UL in a circle with the two letters offset at a 30 angle from one another) is not permitted in the label artwork. The Verification Mark of Underwriters Laboratories on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under this Verification and Follow- Up Service. The Verification Mark for these products includes the "VERIFIED by Underwriters Laboratories," an issue or serial number, the product name "Data Transmission Cable", and the Specification name and/or number. In addition to the marking on the tag, reel, or smallest unit container, cables that have been Verified by UL in accordance with the signal transmission characteristics, and have not been Listed by UL as Communications Cable are surface marked with the statement "Verified by Underwriters Laboratories in accordance with [Specification name(s) and/or number(s)] Only" in the surface print legend. The UL symbol [either the UL in a circle symbol or "(UL)"] is not used in place of the wording "Underwriters Laboratories" in the statement.

Cabling products tested under the Levels XP Structured Cabling Program and the Proprietary Structured Cabling Program are field assembled cabling and connectivity products. The Type R UL Verification Mark (label) is not directly applied to structured cabling products. The complete Verification Mark (illustrated below) may appear on a Bill of Lading, a Bulk Shipment Certificate, or on UL's Certificate of Conformity Assessment. In these cases, the Mark must be reproduced in its entirety and clearly associated with the structured cabling product that was investigated by UL.



VERIFIED

Levels XP Program
Solution Name and Part Number
Control Number

5. GENERAL CHARACTERISTICS

Markings

The requirements for the exact text and location of the markings, and the method of identification, vary among the different types of wire and cable. Wherever possible, the product is surface marked with information necessary for proper installation. When surface marking is not possible — or for other considerations — a portion of the marking may be located on a marker tape, or on the tag, reel or the smallest unit container as permitted by the requirements of each product category. Whenever possible, the rating or characteristic is plainly indicated. Other methods — for example, colored tracers under the jacket or insulation — may be used to identify a certain characteristic, such as temperature rating for some fixture wires. To completely determine the suitability of a particular wiring system, review of the product itself, tag markings and carton markings may be necessary.

Some wire and cable may be marked with multiple Type designations. These products have been evaluated for uses of all Type designations marked.

All markings on or associated with wire and cable, as well as the Listing and Guide Information of the appropriate category, should be consulted to determine all ratings and limitations for proper installation in accordance with requirements of the NEC[®].

UL evaluates wiring products with respect to the marked ratings and uses indicated by the Type designation associated with the UL Mark. Wiring products are not evaluated with respect to marked ratings and uses associated with other certification organizations.

Conductor Material

Compact stranded copper conductors are identified by “compact” or “cmpct,” otherwise wire and cable with bare or coated copper conductor material is not marked with stranding identification.

If the conductor material is either aluminum or copper-clad aluminum, the product, tag or carton markings (depending on the product category) identify the conductor material. These markings will appear as “AL,” “ALUMINUM,” “AL (CUCLAD),” “ALUMINUM (COPPER-CLAD),” “CU-CLAD AL” or “COPPER-CLAD ALUMINUM.”

For some wire and cable, other metals may be used as conductor material. The associated markings for that wire and cable are explained under the heading “OTHER.”

Flammability

UL investigates wiring products with respect to their intended locations and uses as permitted by the NEC[®]. Flammability or resistance to spread or propagation of fire is one of the considerations that enters into the overall investigation of wire and cable. For instance, products that are inherently permitted by the NEC[®] to be installed in cable trays or that are marked for such use are investigated for fire conditions that could exist in a cable tray.

Similarly, cables covered for use in accordance with Articles 725, 760, 770, 800, 820, and 830 of the NEC[®] are investigated with respect to their application: plenum, riser, general use or restricted

residential use. Suffixes to the Type designation identify the use as defined in the appropriate NEC® articles:

- P: Plenum
- R: Riser
- No Suffix, -G: General purpose
- X: Limited residential use

Some wire and cable may also have a suffix “-LS” or “ST1” which means that the entire construction complies with the requirements for flame retardant, limited smoke wiring materials as evaluated per UL 83, UL 1685 or UL 2556.

6. WIRE AND CABLE MARKING

TABLES 1, 2, AND 3

WIRE AND CABLE MARKING TABLE

TABLE 1 - BUILDING WIRES AND CABLES

WIRES		NEC® Article	UL Mark On Product	Temperature (°C) Dry	Temperature (°C) Wet	Voltage (V)	Outdoor Use	Sunlight Resistance	Cable Tray Use	Oil Resistance	Gasoline Resistance	Direct Burial	Submersible Pump Use	Other
Thermoset - Insulated:														
Types RHH		310	ZKST	R	90	600 or 2 kV	-	(35)	(40)	(45)	(46)	-	-	-
RHW		310	ZKST	R	75	600 or 2 kV	-	(35)	(40)	(45)	(46)	-	(51)	-
RHW-2		310	ZKST	R	90	600 or 2 kV	-	(35)	(40)	(45)	(46)	-	(51)	-
SA, SF		310	ZKST	O	90(13)	600	-	-	(40)	-	-	-	-	-
SIS		310	ZKST	R	90	600	-	-	-	-	-	-	-	-
XHH		310	ZKST	R	90	600	-	(35)	(40)	(45)	(46)	-	-	-
XHHW		310	ZKST	R	90	600	-	(35)	(40)	(45)	(46)	-	(51)	-
XHHW-2		310	ZKST	R	90	600	-	(35)	(40)	(45)	(46)	-	(51)	-
Thermoplastic - Insulate d:														
Types FEP, FEPB		310	ZLGR	R	90(13)	600	-	-	-	-	-	-	-	-
FFA		310	ZLGR	R	90(13)	600	-	-	-	-	-	-	-	-
FFAH		310	ZLGR	R	250	600	-	-	-	-	-	-	-	(55)
TBS		310	ZLGR	O	90	600	-	-	-	-	-	-	-	-
TFE		310	ZLGR	R	250	600	-	-	-	-	-	-	-	(55)
THHN		310	ZLGR	R	90	600	-	(35)	(40)	(45)	(46)	-	-	-
THHW		310	ZLGR	R	90	600	-	(35)	(40)	(45)	(46)	-	(51)	-
THW		310	ZLGR	R	75	600	-	(35)	(40)	(45)	(46)	-	(51)	-
THW-2		310	ZLGR	R	90	600	-	(35)	(40)	(45)	(46)	-	(51)	-
THWN		310	ZLGR	R	75	600	-	(35)	(40)	(45)	(46)	-	(51)	-
THWN-2		310	ZLGR	R	90	600	-	(35)	(40)	(45)	(46)	-	(51)	-
TW		310	ZLGR	R	60	600	-	(35)	(40)	(45)	(46)	-	(51)	-
Z		310	ZLGR	R	90(12)	600	-	-	-	-	-	-	-	-
ZW		310	ZLGR	R	90(12)	600	-	(35)	-	-	-	-	(51)	-

WIRE AND CABLE MARKING TABLE

TABLE 1 - BUILDING WIRES AND CABLES		UL Mark		Temperature		Voltage		Outdoor		Sunlight		Cable		Oil		Gasoline		Direct		Submersible		Other	
Article	NEC®	CCN	On Product	(°C) Dry	(°C) Wet	(V)	Use	Resistance	Tray Use	Resistance	Use	Resistance	Resistance	Resistance	Resistance	Resistance	Resistance	Resistance	Resistance	Resistance	Resistance	Resistance	Resistance
Armored:																							
320	AWEZ	O	75	-	600	-	-	-	(40)	-	-	-	-	-	-	-	-	-	-	-	-	-	
320	AWEZ	O	90	-	600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
645	EMFB	R	(4)	-	(22)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
322	GOKT	R	75(3)	-	300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(56)	
324	IKKT	R	(4)	-	300, 600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
620	MSZR	R	60, 90	-	300, 600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
727	NYTT	R	(4)	(17)	(22)	-	-	-	Yes	Yes	-	-	-	-	-	-	-	(50)	-	-	-	(57, 59, 61, 71)	
Instrumentation Tray Cable: Type ITC																							
Instrumentation Tray Cable (hazardous locations): Type ITC-HL																							
727	PJPP	R	(14)	(6)	(21)	Yes	(35)	Yes	Yes	Yes	-	-	-	-	-	-	-	Yes	Yes	-	-	(64)	
328	PITY	R	(5)	(5)	(20)	-	-	-	(40)	(45)	-	-	-	-	-	-	-	(50)	(50)	-	-	(57, 58)	
Medium Voltage: Type MV																							
Classified in Accordance with UL 1072, with Metric Conductors																							
-	PVWV	R	(5)	(5)	(20)	-	-	-	-	-	-	-	-	-	-	-	-	(47)	(47)	-	-	(57, 58)	
330	PJAZ	R	(14)	(6)	(21)	Yes	(35)	Yes	Yes	Yes	-	-	-	-	-	-	-	Yes	Yes	-	-	(64)	
Metal-Clad: Type MC																							
Metal-Clad: Type MC Classified in Accordance with UL 1569, with Metric Conductors																							
-	PJFJ	R	(14)	(6)	(21)	Yes	(35)	Yes	Yes	Yes	-	-	-	-	-	-	-	Yes	Yes	-	-	(64)	
330	PJPP	R	(14)	(6)	(21)	Yes	(35)	Yes	Yes	Yes	-	-	-	-	-	-	-	Yes	Yes	-	-	(64)	
Metal-Clad (Hazardous Location): Type MC-HL																							
332	PRKV	O	90(7)	90(7)	600(27)	Yes	(35)	Yes	(40)	Yes	-	-	-	-	-	-	-	Yes	Yes	-	-	(55, 64, 73)	
Mineral Insulated Metal Sheathed Cable: Type MI																							
Nonmetallic Sheathed: Types NMB, NMC-B																							
334	PWVX	R	90(2)	-	600	-	-	-	(40)	-	-	-	-	-	-	-	-	-	-	-	-	-	
Non-Power-Limited Fire Alarm Signaling:																							
760	HNHT	R	(4)	(6)	(22)	-	-	-	-	-	-	-	-	-	-	-	-	Yes(50)	-	-	-	(75)	
Types: NPLF, NPLFR, NPLFP																							
336	QPOR	R	(14)	(8)	600 or 2 kV	-	-	-	Yes	(45)	-	-	-	-	-	-	-	(47)	(50)	-	-	(57, 58, 59, 71)	
Power and Control Tray Cable: Type TC																							
Service Entrance:																							
338	TYLZ	R	(14)	-	600	Yes	Yes	Yes	(40)	-	-	-	-	-	-	-	-	-	-	-	-	-	
338	TYLZ	R	75(1)	75(1)	600	Yes	Yes	Yes	-	-	-	-	-	-	-	-	-	-	Yes	Yes	-	(51)	
338	TYLZ	R	90	90	600	Yes	Yes	Yes	-	-	-	-	-	-	-	-	-	-	Yes	Yes	-	(51)	
Underground Feeder and Branch Circuit Cable:																							
340	YDUX	R	60	60	600	(31)	(35)	(40)	-	-	-	-	-	-	-	-	-	-	Yes	Yes	-	(51)	
340	YDUX	R	90(2)	60	600	(31)	(35)	(40)	-	-	-	-	-	-	-	-	-	-	Yes	Yes	-	(51)	

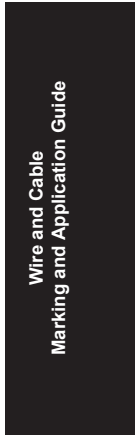


TABLE 2 - LOW VOLTAGE CABLES, FLEXIBLE CORD AND FIXTURE WIRE													
Low Voltage Cables	NEC® Article	UL Mark On Product	Temperature (°C) Dry	Temperature (°C) Wet	Voltage (V)	Outdoor Use	Sunlight Resistance	Cable Tray Use	Oil Resistance	Gasoline Resistance	Direct Burial	Submersible Pump Use	Other
Communications Cable:													
Types CM, CMG, CMR, CMP	800	DUZX	R	60(15)	-	(22)	(34)	Yes	-	-	-	-	(57, 60, 68, 75)
Types CMUC, CMX, CMX Outdoor	800	DUZX	R	60(15)	-	(22)	(34)	-	-	-	-	-	(57, 60, 68)
Community Antenna Television Cable:													
Types CATV, CATVP, CATVR	820	DVCS	R	60(15)	-	(22)	-	Yes	-	-	(50)	-	(60, 75)
Type CATVX	820	DVCS	R	60(15)	-	(22)	-	-	-	-	(50)	-	(60, 75)
Optical Fiber Cable:													
Types OFC, OFCG, OFCP, OFCR, OFN, OFNG, OFNP, OFNR	770	OAYK	R	-	-	(22)	-	Yes	-	-	-	-	(75)
Power-Limited-Circuit Cable:													
Types CL2, CL2R, CL2P, CL3, CL3R, CL3P	725	QPTZ	R	60(15)	(17)	(22)	-	Yes	-	-	(50)	-	(57, 60, 61, 75)
Types CL2X, CL3X	725	QPTZ	R	60(15)	(17)	(22)	-	-	-	-	(50)	-	(57, 60, 61)
PLTC	725	QPTZ	R	60(15)	(17)	(22)	-	Yes	(45)	-	(50)	-	(57, 59, 60, 61, 71)
Power-Limited Fire Alarm Cable:													
Types FPL, FPLR, FPLP	760	HNIR	R	60(15)	(17)	(22)	-	-	-	-	(50)	-	(57, 60, 75)
Network Powered Broadband Communications Cable:													
Types BL, BLP, BLR, BM, BMR	830	PWIP	R	60(15)	-	(22)	-	Yes	-	-	-	-	(57, 60, 75)
Type BLX	830	PWIP	R	60(15)	-	(22)	-	Yes	-	-	-	-	(57, 60)
BLU, BMU	830	PWIP	R	60(15)	-	(22)	-	-	-	-	Yes	-	(57, 60)

WIRE AND CABLE MARKING TABLE																
TABLE 2 - LOW VOLTAGE CABLES, FLEXIBLE CORD AND FIXTURE WIRE																
Flexible Cords	NEC® Article	UL Mark On Product	Temperature (°C) Dry	Temperature (°C) Wet	Voltage (V)	Outdoor Use	Sunlight Resistance	Cable Tray Use	Oil Resistance	Gasoline Resistance	Direct Burial	Submersible Pump Use	Other	Other	Other	
																Temperature (°C) Dry
Types C, PD	400 ZJ CZ	R	(4)	-	300(29)	-	-	-	-	-	-	-	-	-	-	-
E	400 ZJ CZ	R	(4)	-	300	-	-	-	-	-	-	-	-	-	-	-
EO, ETP, ETT	400 ZJ CZ	R	(4)	-	300	-	-	-	Yes	-	-	-	-	-	-	-
FPD	400 ZJ CZ	R	(4)	-	300	-	-	-	-	-	-	-	-	-	-	-
FPN	400 ZJ CZ	R	(4)	-	300	-	-	-	Yes	-	-	-	-	-	-	-
HSJ	400 ZJ CZ	R	(4)	-	300	-	-	-	-	-	-	-	-	-	-	-
HSO, HSJO, HSJOO	400 ZJ CZ	R	(4)	-	300	-	(37)	-	Yes(70)	-	-	-	-	-	-	-
HSJOW, HSJOWW	400 ZJ CZ	R	(4)	-	300	Yes	(37)	-	Yes(70)	-	-	-	-	-	-	-
NSP-1, NSP-2	400 ZJ CZ	R	(4)	-	300	-	-	-	-	-	-	-	-	-	-	-
NISPE-1, NISPE-2	400 ZJ CZ	R	(4)	-	300	-	-	-	-	-	-	-	-	-	-	-
NSPT-1, NSPT-2	400 ZJ CZ	R	(4)	-	300	-	-	-	-	-	-	-	-	-	-	-
S	400 ZJ CZ	R	(4)	-	600	(30)	-	-	-	-	-	-	-	-	(62, 63)	-
ST	400 ZJ CZ	R	(4)	-	600	(30)	(37)	-	-	-	-	-	-	-	(62, 63)	-
SE	400 ZJ CZ	R	(4)	-	600	(30)	(37)	-	-	-	-	-	-	-	(62)	-
SEO, SEOO	400 ZJ CZ	R	(4)	-	600	(30)	(37)	-	Yes(70)	-	-	-	-	-	(62)	-
SJ, SJT	400 ZJ CZ	R	(4)	-	300	(30)	(37)	-	-	-	-	-	-	-	(63)	-
SJE, SJE00	400 ZJ CZ	R	(4)	-	300	(30)	(37)	-	-	-	-	-	-	-	-	-
SJEO	400 ZJ CZ	R	(4)	-	300	(30)	(37)	-	Yes(70)	-	-	-	-	-	-	-
SJO, SJO0, SJTO, SJT00	400 ZJ CZ	R	(4)	-	300	(30)	(37)	-	Yes(70)	-	-	-	-	-	(63)	-
SO, SOO, ST0, ST00	400 ZJ CZ	R	(4)	-	600	(30)	(37)	-	Yes(70)	-	-	-	-	-	(62, 63)	-
SP-1, SP-2, SP-3, SRD-SRDT	400 ZJ CZ	R	(4)	-	300	-	-	-	-	-	-	-	-	-	-	-
SPE-1, SPE-2, SPE-3, SRDE	400 ZJ CZ	R	(4)	-	300	-	-	-	-	-	-	-	-	-	-	-
SPT-1, SPT-2, SPT-3	400 ZJ CZ	R	(4)	-	300	(30)	-	-	-	-	-	-	-	-	-	-
SPT-1W, SPT-2W	400 ZJ CZ	R	(4)	-	300	(30)	(37)	-	-	-	-	-	-	-	-	-
SV, SVT	400 ZJ CZ	R	(4)	-	300	-	-	-	-	-	-	-	-	-	-	-
SVE	400 ZJ CZ	R	(4)	-	300	-	-	-	-	-	-	-	-	-	-	-
SVEO, SVE00	400 ZJ CZ	R	(4)	-	300	-	-	-	Yes	-	-	-	-	-	-	-
SVO, SVO0, SVTO, SVT00	400 ZJ CZ	R	(4)	-	300	-	-	-	Yes(70)	-	-	-	-	-	-	-
TPT, TST	400 ZJ CZ	R	(4)	-	300	-	-	-	-	-	-	-	-	-	-	-
Clock Cord	-	ZJ CZ	R	(4)	125	-	-	-	-	-	-	-	-	-	-	-
XTW, CXTW	-	ZJ CZ	R	(4)	300	Yes	(37)	-	-	-	-	-	-	-	-	-

WIRE AND CABLE MARKING TABLE

TABLE 2 - LOW VOLTAGE CABLES, FLEXIBLE CORD AND FIXTURE WIRE														
Fixture Wire	NEC® Article	OCN	UL Mark On Product	Temperature (°C) Dry	Temperature (°C) Wet	Voltage (V)	Outdoor Use	Sunlight Resistance	Cable Tray Use	Oil Resistance	Gasoline Resistance	Direct Burial	Submersible Pump Use	Other
Types KF-1, KF-2, KFF-1, KFF-2	402	ZIPR	O	200 (9)	-	(24)	-	-	-	-	-	-	-	(55)
PAF	402	ZIPR	R	250(9)	-	600	-	-	-	-	-	-	-	(55)
PAFF	402	ZIPR	R	150(9)	-	600	-	-	-	-	-	-	-	-
PF, PGF	402	ZIPR	O	200 (9)	-	600	-	-	-	-	-	-	-	(55)
PFF, PGFF	402	ZIPR	O	150(9)	-	600	-	-	-	-	-	-	-	(55)
PTF	402	ZIPR	R	250	-	600	-	-	-	-	-	-	-	(55)
PTFF	402	ZIPR	R	150	-	600	-	-	-	-	-	-	-	-
RFH-2, FFH-2	402	ZIPR	O	75(9)	-	600	-	-	-	-	-	-	-	-
SF-1, SF-2	402	ZIPR	O	200 (9)	-	(24)	-	-	-	-	-	-	-	(55)
SFF-1, SFF-2	402	ZIPR	O	150(9)	-	(24)	-	-	-	-	-	-	-	(55)
TF, TFF	402	ZIPR	R	60	-	600	-	-	-	(45)	(46)	-	-	-
RFHH-2, RFHH-3	402	ZIPR	R	90(9)	-	600	-	-	-	-	-	-	-	-
TFN, TFFN	402	ZIPR	R	90(9)	-	600	-	-	-	(45)	(46)	-	-	-
XF, XFF	402	ZIPR	R	150(9)	-	300	-	-	-	-	-	-	-	(55)
ZF, ZFF	402	ZIPR	R	150(9)	-	600	-	-	-	-	-	-	-	(55)
ZHF	402	ZIPR	R	200(9)	-	600	-	-	-	-	-	-	-	(55)

WIRE AND CABLE MARKING TABLE														
TABLE 3 - SPECIAL PURPOSE WIRES AND CABLES														
	NEC® Article	CCN	UL Mark On Product	Temperature (°C) Dry	Temperature (°C) Wet	Voltage (V)	Outdoor Use	Sunlight Resistance	Cable Tray Use	Oil Resistance	Gasoline Resistance	Direct Burial	Submersible Pump Use	Other
Battery Lead Wire	-	VZSE	R	60(15)	-	(25)	-	-	-	Yes	Yes	-	-	-
Boat Cable	-	BDFX	R	(10)	(10)	(25)	-	-	-	(45)	-	-	-	-
Bus Drop Cable	368	ZIMX	R	60(15)	(8)	600	(32)	-	-	(45)	-	-	-	-
Electric Vehicle Cable	400	FFSO	R	60 - 105	60	300, 600	Yes	Yes	-	Yes	-	-	-	-
Festoon Cable	610	ZJPE	R	60(15)	-	600	(32)	-	-	(45)	-	-	-	-
Flexible Motor Supply Cable	-	ZJFH	R	90	-	1000 or 2000	-	(35)	Yes	(45)	(47)	(50)	-	(57, 58)
Flexible Stage and Lighting Power Cable: Types SC, SCE, SCT	400	ILPH	R	60(15)	-	600	(30)	(36)	-	Yes	-	-	-	-
Gas-Tube-Sign Cable: Type GTO	600	ZJQX	R	105(15)	-	(26)	-	Yes	-	-	-	-	-	(72)
Golf Course Sprinkler Wire	-	ZMHX	O	60	60	300	-	-	-	-	-	Yes	-	-
Heat-Resistant Wire: Types TGT, TGS, TMGT, KGS, KGT, TGGT, ITFL	-	ZNNA	O	(4)	-	300	-	-	-	-	-	-	-	(64)
Inductive-Loop Detector Lead-In Cable	-	ZMHX	R	60	60	600	(32)	-	-	(45)	-	-	-	-
Irrigation Cable	675	OFFY	R	75	60	600	Yes	Yes	-	-	-	-	-	-
Irrigation-Machine Feeder, Control and Signal Cable	-	ZJVK	R	60, 75	60	300, 600	-	-	-	-	-	Yes	-	-
Low Voltage Battery Cable Classified in Accordance with SAE J1127	-	VZSL	R	80, 125	-	60 Vdc, 25 Vac	-	-	-	Yes	Yes	-	-	-
Machine Tool Wires: Type MTW	670	ZKHZ	R	90	60	600	-	(35)	(40)	Yes	(46)	-	-	(67)
Marina and Boatyard Cable	555	PDYQ	R	75	75	600	-	Yes	-	Yes	Yes	-	-	-
On-board cable	-	VZSR	R	60(15)	60	300, 600(28)	-	(36)	-	Yes	(48)	-	-	-
Pendant Cable	610	ZKKA	O	60	-	300, 600	(32)	-	-	(45)	-	-	-	-
Photovoltaic Wire	690	ZKLA	R	90 - 150	90	600 - 2000	Yes	Yes	-	-	-	(50)	-	-
Portable Power Cables: Types W, G, G-GC, PPE	400	QPMU	R	75	(8)	2000	(33)	(35)	-	Yes	-	-	-	-
Recreational Vehicle Cable (Low Voltage)	551	ZKRU	R	(4)	(8)	(22)	-	-	-	-	-	-	-	(60)
RF Coaxial Cable	820	ZMHX	R	60	-	(22)	-	-	-	-	-	-	-	(60, 65)
Satellite Antenna Cable	725	ZMHX	R	(4)	-	(25)	-	(35)	-	-	-	(50)	-	-
Shipboard Cable, Marine	-	UBVZ	R	(4)	60	(25)	-	-	-	Yes	-	-	-	-
Shipboard Cable, Marine Classified in Accordance with International Specifications	-	UBWK	R	(4)	60	(25)	-	-	-	Yes	-	-	-	-
Slotted Coaxial Cable	820	ZMHX	R	60	-	(22)	-	-	-	-	-	-	-	-
Submersible Pump Cable Using TPE Insulation	-	ZMHX	R	(4)	60	600	-	-	-	-	-	-	Yes	-
Telecommunication Central Office Power, Battery, and Distribution Cables	-	ZKSB	R	75, 90, 105	60, 75, 90	600, 1 kV, 2 kV	-	(35)	(40)	-	-	-	-	-
Telephone Drop Wire	800	ZKSG	R	60	60	300	Yes	Yes	-	-	-	-	-	(60)
Traffic Signal Cable	-	XNLT	O	-	-	(25)	Yes	Yes	-	-	-	-	-	(69)
Trailing Cable Classified in Accordance with DIN Publication DIN VDE 0250 Part 813	-	XNUA	P	-	-	0.6/1 kV - 20/35 kV	Yes	-	-	-	-	-	-	-
Undercarpet Digital Communications Cable	800	ZMHX	R	60	-	(22)	-	-	-	-	-	-	-	(66)
Underground Low Energy Circuit Cable	725	ZLIA	O	60	60	30, 150	-	(35)	-	-	-	Yes	-	-
Vault Lacing Cable	-	ZMHX	O	60	-	150	-	-	-	-	-	-	-	-
Welding Cable	630	ZMAY	R	60(11)	(11)	100 or 600	Yes	-	(41)	(45)	-	-	-	-
Wind Turbine Tray Cable	-	ZGZN	R	90	(18)	1000	-	(35)	Yes	(45)	(47)	-	-	(57)

7. EXPLANATIONS FOR COLUMN HEADINGS IN MARKING TABLE

The column headings of Tables 1, 2 and 3 identify:

WIRE AND CABLE CATEGORY/TYPE

Lists each wire, cable and flexible cord category as it appears in the UL White Book and UL's Online Certifications Directory. Generally, the category, type or both are on the product.

NEC® ARTICLE

Indicates the primary NEC® Article that references the category/type. The NEC® article is typically not marked on the product.

(CCN)- UL CATEGORY CODE

Products are Listed or Classified by UL under an appropriate product category. A four-letter category code is the UL product category code designation. Each UL product category code provides a direct link to the Guide Information for the product category. The Guide Information includes the scope of the products covered, information relating to limitations or special conditions applying to the product, the requirements used for the investigation of the products, installation and use information, and information on product markings and the UL Mark to be used on the product. Guide Information is available in the UL White Book and UL's Online Certifications Directory at www.ul.com/database. This category code is not marked on the product.

UL MARK ON PRODUCT

Indicates whether the UL Mark ("UL" in a circle or parentheses) is required (R), optional (O) or prohibited (P) on the product. See the section titled "UL Listing Mark."

8. EXPLANATION OF NOTES FOR MARKING TABLES

9. TEMPERATURE (°C) DRY AND TEMPERATURE (°C) WET

These two columns indicate temperature rating for the wire and cable when used in dry locations or when exposed to water or moisture such as in wet and damp locations.

Numbers in parentheses indicate the following:

- (1) Wire evaluated for use at 90°C dry and wet is marked with the suffix "-2" after the Type designation.
- (2) Cable is to be used at the ampacity for 60°C conductors in accordance with NEC®, Table 310.15(B)(16).
- (3) Cords evaluated for water resistance have a "W" in the Type designation, i.e. Type SJTW. The terms "water resistant" or "water resistant 60°C" may also be marked in addition to the "W" designation.

- (4) The wire or cable has been investigated for the temperature rating marked on the product, tag, reel or smallest unit container.
- (5) Types MV-90 and MV-105 are evaluated for use in wet or dry locations at 90°C and 105°C, respectively. Type MV- 90 DRY is only evaluated for use in dry locations at 90°C.
- (6) Cable evaluated for wet-location use is marked “WET-LOCATIONS CABLE” or “WET-LOCS CABLE.” Cable containing conductors evaluated for wet-location use may be marked, but such marking is not required.
- (7) 250°C for special applications in locations where environmental conditions require operation at above 90°C temperature. Temperatures of fittings are limited to 85°C in dry locations and 60°C in wet locations.
- (8) Wire or cable evaluated for wet-location use is marked “60°C WET” or “75°C WET.”
- (9) Temperature rating may be indicated on the product by colored marker threads located under either the insulation or separator as in the following table:

Table	Rating (°C)	Color
RFH-2, FFH-2	75	Green
TFN, TFFN RFHH-2, RFHH-3	90	Red
XF, XFF, SFF-1, SFF-2, PFF, PGFF, PAFF, PTF, ZF, ZFF	150	Orange
SF-1, SF-2, PF, PGF, ZHF, KF-1, KF-2, KFF-1, KFF-2	200	Black
PAF, PTF	250	Two black

- (10) The cable is marked with one of the following temperature ratings or codes; when no code is indicated, the product is marked with the rating.

Rating	Code
60°C dry 60°C wet	BC-1W1
75°C dry 60°C wet	BC-2W1
75°C dry 75°C wet	BC-2W2
80°C dry 60°C wet	BC-3W1
80°C dry 75°C wet	BC-3W2
90°C dry 60°C wet	BC-4W1
90°C dry 75°C wet	BC-4W2
90 C dry 90 C wet	BC-4W3
105°C dry 60°C wet	BC-5W1
105°C dry 75°C wet	BC-5W2
105 C dry 90 C wet	BC-5W3
105°C (dry only)	-
125°C (dry only)	-
200°C (dry only)	-

- (11) Welding cable rated 600V is investigated for use in 75°C dry or wet locations.
- (12) 90°C dry and damp location. 150°C dry locations for special applications in locations where environmental conditions require maximum conductor operating temperatures above 90°C.
- (13) 200°C in dry locations for special applications.
- (14) The temperature rating of the cable is the rating marked on the cable or implied by the conductor type in the cable.
- (15) Indicates minimum temperature rating. Suitable for use at higher temperatures if marked on the cable or cord. The higher temperatures (above 60°C) only apply to dry applications.
- (16) Note relocated to (29)
- (17) Cable evaluated for wet location use is marked "wet" or "wet location."
- (18) Cable evaluated for wet location use is marked "90C Wet or Dry".
- (19) Note not used.

10. VOLTAGE (V)

Indicates voltage rating. If the rating is not marked on the product, the wire or cable has been evaluated for the rating entered in the table. If marked higher than the rating in the table, it is rated as marked. Notes in the tables indicate the following:

(20) The voltage rating (kV) is one of the following, as marked: 2.4, 5, 8, 15, 25, 28 or 35.

(21) 600V or 2kV. Type MC cable containing Type MV conductors has the voltage rating of the conductors. Type MV cable in Type MC cable armor is surface or tape marked "Type MV Type MC" and it has a Type MV cable Listing Mark.

(22) Type designation indicates suitability for use in accordance with the appropriate NEC® Article, with respect to voltage and power limitations.

(23) The voltage rating (dc) is one of the following, as marked: 30, 48, 60, 90 or 150

(24) Rating is indicated by number in the Type designations as follows:

Suffix	Rating (V)
-1	300
-2	600

(25) The wire or cable may be evaluated for various voltage ratings. The rating is marked on the product, a tag attached to the reel or smallest unit container.

(26) Voltage rating is indicated on the product by a suffix after the Type designation as follows:

Suffix	Rating (kV)
-5	5
-10	10
-15	15

(27) Some Mineral-Insulated cable may be rated 300V for use in Class 1 remote control and signaling circuits not exceeding 300V.

(28) Rated ac or dc

(29) May be rated 600 volts when employing 45-mil insulation.

11. OUTDOOR USE

“Yes” indicates that the wire or cable has been evaluated for direct exposure to outdoor conditions. Generally, there is no marking indicating outdoor use coverage. Notes in the tables indicate the following:

(30) A product evaluated for outdoor use has a “W” in its Type designation, e.g. “SJTW.” For a cord evaluated and marked for recreational vehicle or mobile home use, outdoor use always applies and the marking “W” is optional.

(31) Type UF and UF-B cables evaluated for installation above-ground are marked “SUNLIGHT RESISTANT.”

(32) Cable evaluated for outdoor use is marked "outdoor" or "outdoor use".

(33) Cable evaluated for outdoor use is marked “SUNLIGHT RESISTANT” or “SUN. RES.” plus “60°C WET”, “75°C WET”, or “90°C WET”.

(34) Type CMX cable marked “Outdoor” is suitable for installation outdoors on dwellings.

12. SUNLIGHT RESISTANCE

“Yes” indicates that the outer nonmetallic covering of the product has been evaluated for direct exposure to ultraviolet (UV) radiation from the sun. This coverage is not generally marked on the product. Cables with an overall metallic covering are always considered suitable for exposure to sunlight. The use limitations and associated markings are specified in the tables by the following:

(35) A product evaluated for sunlight resistance is marked “SUNLIGHT RESISTANT”, “SUN. RES.” or "SR."

(36) A product evaluated for sunlight resistance is marked “SUNLIGHT RESISTANT”, “SUN. RES.”, or "W."

(37) Cords with the 'W' suffix are suitable for use in wet locations and are sunlight resistant

(38), (39) Notes not used.

13. CABLE TRAY USE

"Yes" indicates that the cable has been evaluated for use in cable trays in accordance with NEC® Articles 310, 318 and other applicable Articles. Generally, this coverage is not marked on the product. Notes in the tables indicate the following:

(40) When evaluated for use in cable trays, the product is marked "for cable tray use," "for CT use" or "for use in cable trays."

(41) For trays dedicated to welding cable only, per NEC® section 630.42. May be marked on the product.

(42), (43), (44) Notes not used.

14. OIL RESISTANCE

"Yes" indicates that the product has been investigated for use in locations exposed to oil at a temperature of 60°C or less. Generally, this coverage is not marked on the product. If the product has been investigated for oil resistance at higher than 60°C temperatures, it is rated as marked.

(45) A product evaluated for 60°C oil resistance is marked "OIL RESISTANT I", "OIL RES I", "OIL RESISTANT", or "PRI." A product evaluated for 75°C oil resistance is marked "OIL RESISTANT II", "OIL RES II", or "PRII."

15. GASOLINE RESISTANCE

"Yes" indicates that the product has been evaluated for use in locations exposed to liquid gasoline, gasoline vapors and vapors from similar light petroleum solvents. Generally, this coverage is not marked on the product. Notes in the tables indicate the following:

(46) A product evaluated for 60°C oil resistance and for gasoline resistance is marked "GASOLINE AND OIL RESISTANT I", or "GR1." Similarly, for 75°C oil and for gasoline resistance, the product is marked "GASOLINE AND OIL RESISTANT II" or "GR2."

(47) When evaluated for gasoline resistance only, the insulated conductors are marked "GASOLINE RESISTANT". If this marking appears on the outer covering of the cable, "GASOLINE RESISTANT" is followed by "CDRS", "CONDS" or "CONDUCTORS".

(48) A product marked with the suffix "G" has been evaluated for gasoline resistance.

(49) Note not used.

16. DIRECT BURIAL

“Yes” indicates that the wire or cable has been evaluated for direct burial in the earth. Generally not marked on the product. Notes in the tables indicate the following:

(50) When evaluated for direct burial use, the product is marked “FOR DIRECT BURIAL,” “DIRECT BURIAL,” “DIR BUR” or “DIR BURIAL.”

17. SUBMERSIBLE PUMP USE

“Yes” indicates that the wire or cable has been evaluated for use in wiring of pumps and/or submersible pumps. Product name identifies the use. Notes in the tables indicate the following:

(51) When evaluated, the product is marked “PUMP CABLE” or “SUBMERSIBLE PUMP CABLE.”

(52), (53), (54) Notes not used.

18. OTHER

Uses, exposures, and constructional features not otherwise covered in the tables are referenced in this column through the following notes. If not otherwise specified, the product has not been evaluated for any other condition unless marked on the product.

(55) Nickel or nickel-based alloy may be used with the product. Marking not required.

(56) Product is marked with the ampacity: “___ amp” or “___ A.”

(57) Optical Fibers. When these are present, the product is marked “Contains optical-fiber member(s)” or “OF” after the wire or cable Type designation.

(58) Gas/Vapor Blocked. When evaluated for gas/vapor blocking, the product is marked with “Gas/Vapor Blocked,” the minimum length required to attain the blocking, and the designation of the hazardous location for which the wire or cable is intended, such as “Class ____, Group ____.”

(59) The overall jacket on Types ITC, TC and PLTC is a “gas/vapor tight continuous sheath” as discussed in Sections 501.15(D) and 501.15(E) of the NEC®.

(60) Copper-clad steel conductor may be used with product. . Copper clad aluminum may be used as the center conductor in a coaxial construction. Marking not required.

(61) Each pair of thermocouple-extension wires is marked with the nominal AWG size and one of three designations —“THCPLXTN,” “For thermocouple-extension use only” or “Thermocouple-extension wire only,” — plus an identification(s) from either of the following columns for the combination(s) of thermocouple-extension conductor metals used:

Type	Designation	Combination of Metals
JX		Iron/Constantan
KX		Chromel/Alumel
TX		Copper/Constantan

EX	Chromel/Constantan
SX, RX	Copper/Alloy
BX	Copper/Copper
NX	Nickel-Chromium-Silicon/Nickel-Silicon-Magnesium
GX	Tungsten/Tungsten-26% Rhenium
CX	Tungsten-5% Rhenium/Tungsten-25% Rhenium
DX	Tungsten-3% Rhenium/Tungsten-25% Rhenium

Only cables containing thermocouple-extension wire may have the markings on the cable instead of having each pair marked.

(62) Recreational Vehicle or Mobile Home Use. When evaluated for this use, the product is marked "For Mobile Home or Recreational Vehicle Use: _____ Amperes."

(63) Low Leakage Current Rating. When evaluated for use as low leakage-current cord in a cord set or power-supply cord for earth-grounded, direct-patient, contact medical and dental equipment, the cable is marked "Max leakage/10 ft. at _____ V: _____ μ A to green and _____ μ A thru jacket."

(64) Various conductor materials may be used. The metal type is marked on the tag attached to the reel or smallest unit container.

(65) Insulated conductors evaluated for a 600V rating are marked "Power Leg" on the insulation surface.

(66) Conductive Thermoplastic Shield or Jacket. Jacket or thermoplastic shield is conductive when the product is marked "Conductive PVC shield" or "Black material is conductive."

(67) Flexing and Constant-Flexing Services. When evaluated for flexing services, the product is marked "Flexing" or "Class K." When evaluated for constant-flexing services, the product is marked "Constant flexing," "Class M" or "Class K."

(68) Listed cables that are additionally marked "Verified UL Category 3, 5, 5E, 6 or 6A" comply with the UL Data Transmission Performance Category Marking Program. "CAT" may be substituted for "Category." Listed cables that are additionally marked "Verified in Accordance With (Specification: Name and/or number)" comply with the requirements of a referenced transmission performance specification. For example, "Verified (UL) Category 6 or 7 NEMA WC-66." Effective January 31, 2012, cables are evaluated in accordance with ANSI/TIA-568C.2, "Balanced Twisted-Pair Telecommunications Cabling and Components Standards and Category 5 cables can no longer reference the ANSI/TIA-568C.2 Standard. Category 5 cables intended to bear a UL Verification Mark (label) and Verification surface markings can only be Verified under the "UL Performance Category Program". Any surface print reference to TIA/EIA-568B or ANSI/TIA-568C.2 is prohibited.

(69) Classified in accordance with International Municipal Signal Association, Inc. (IMSA) specifications. Intended for use in underground conduit or as an aerial cable only. Not evaluated for use as a substitute for cables or wiring systems covered in the NEC[®].

(70) "OO" indicates oil resistant insulation and jacket. "O" indicates oil resistant jacket only.

(71) Cable suitable for use as described in NEC[®] Sections 336.10(7), 725.154(D)(1), or 727.4(5) is surface marked with the suffix "- ER" (formerly "Open Wiring") directly following the Type letters.

(72) Cables marked "Integral Sleeve" have been evaluated for equivalence to a GTO cable with a sleeve installed over it as required in some electric signs.

(73) MI Cables with outer nonmetallic jackets are:

- (1) not suitable for use in ducts, plenums, or other spaces used for environmental air and are so marked.
- (2) marked "not suitable for use on or in buildings" if they have not been investigated for flame retardance. Such cables are sunlight resistant.
- (3) marked for cable tray use if they comply with the applicable flame test. These cables may be marked for sunlight resistance if applicable.

(74) Note not used.

(75) Plenum cables (those with a "P" as the last letter) may also be Listed as "Limited Combustible Cable." All marking requirements apply.

APPENDIX A

WIRE, CABLE AND CORD DESIGNATIONS

In general, the letter designations assigned to wire, flexible cord and cable in the NEC[®], for identification purposes, are established according to a coding system that provides information on intended use, insulation type and insulation temperature rating. This coding system, to which there are exceptions, does not cover all NEC[®] designations. The coding system is as follows:

CONDUCTORS FOR GENERAL WIRING NEC[®] Article 310, Table 310.104(A)

B	Braid
FEP	Fluorinated ethylene propylene insulation
H	75°C (Note: Lack of "H" indicates 60°C)
HH	90°C
N	Nylon jacket
PFA	Perfluoroalkoxy insulation
R	Thermoset insulation
S	Silicone (Thermoset) insulation
T	As first letter - Thermoplastic insulation
TFE	Polytetrafluoroethylene
U	Underground use
W	Moisture resistant
X	Cross-linked polymer insulation
Z	Modified ethylene tetrafluoroethylene insulation

Examples: RHW –Thermoset Insulation, 75°C, Moisture resistant
THHN –Thermoplastic Insulation, 90°C dry, nylon jacket

FLEXIBLE CORD AND CABLE NEC[®] Article 400, Table 400.4

E	As first letter — Elevator cable
E	After first letter — Thermoplastic elastomer insulation and jacket
EV	Electric Vehicle Cable
H	Heater cord
NI	“Non-Integral,” used for parallel cords such as Type NISPT-1 to denote insulated conductors and jacket are separate
O	Oil resistant. Single “O” means jacket only is oil resistant; double “O” means jacket and conductor insulation are oil resistant
P	Parallel conductor cord
S	Extra hard usage Flexible Cord
SJ	Hard usage Flexible Cord
SV	Not hard usage Flexible Cord
T	As the first letter — Tinsel cord. Single flattened 27 AWG conductor wound around insulating core, for very low current, highly flexible application
T	After the first letter — Thermoplastic insulation and jacket

-1, -2, -3	Insulation thickness for parallel cords, thinnest to thickest. Actual insulation thickness varies with cord type and AWG size
XTW	Parallel cord for decorative lighting strings
CXTW	Twisted pair cord or single conductor for decorative lighting strings
W	As the Last letter — Suitable for use in wet locations and sunlight resistant
W	As the only letter — Portable Power Cable

Examples: SJTO—Hard usage, thermoplastic, oil resistant jacket
SPT-2—Parallel Cord, thermoplastic

Fixture Wire **NEC® Article 402, Table 402.3**

F	Fixture wire, standard stranding
FF	Fixture wire, flexible stranding
G	Glass braid
H	75°C insulation
HH	90°C insulation
K	Aromatic polyimide tape insulation
N	Nylon jacket
P	Fluorinated ethylene propylene insulation
R	Thermoset insulation
S	Silicone (Thermoset) insulation
T	Thermoplastic insulation
X	Cross-linked synthetic polymer insulation
Z	Modified tetrafluoroethylene insulation
-1, 2, 3	Insulation thickness, thinnest to thickest for some types. Actual insulation thickness varies, with insulation types and AWG size.

Examples: SF-1—Silicone rubber fixture wire
TFF—Thermoplastic, flexible stranded fixture wire



Marking and Application Guide

ALTERNATIVE ENERGY EQUIPMENT AND SYSTEMS

JANUARY 2013

PREFACE

Interest in the use of alternative energy in the form of renewable energy has increased substantially because of the potential to provide increased reliability and lower cost of power delivery to the customer, particularly with customer-site generation. There are also substantial environmental benefits in reduced or no emissions as compared with traditional technologies.

The new means for generation, storage and transmission of energy present exciting possibilities but raise many questions about safety and reliability, questions that must be answered to ensure public acceptance. For example, the integration of new generation and storage technologies with existing systems need to provide safe and reliable service during peak and off peak demand.

UL is committed to the advancement of safe, renewable and sustainable energy through doing the necessary research, testing and development of standards to help society make a smooth and safe transition to alternative energy.

The equipment and systems used for alternative energy are required to comply with numerous electrical, fire, mechanical, plumbing, and building-related codes and installation requirements. These different codes require compliance with different standards and installation requirements.

UL has developed this guide for use by code and inspection authorities, electric utilities, contractors, installers, users, system designers, and other interested parties to aid in understanding the basic components of alternative energy systems and the applicable codes and standards in order to facilitate a reasonably safe and code-compliant installation.

UL Marking and Application Guides are updated as necessary due to new product development, changes in the codes, or the need for clarification. To confirm the current status of any UL Marking Guide, please consult the Code Authorities page of the UL Web site at www.ul.com/codeauthorities.



Your comments or suggestions are welcome and appreciated. They should be sent to:

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INTRODUCTION

USE OF THIS GUIDE

This guide is intended to assist regulatory authorities, designers, and installers in determining the suitability of specific alternative energy equipment in a particular installation and use, and to address concerns related to fire, shock, plumbing, gas, and/or mechanical hazards and performance reliability.

Products are Listed or Classified by UL under an appropriate product category. A four-letter code (shown in parenthesis) following every category title in this guide is the UL product category code designation. A list of alternative energy equipment product categories evaluated by UL, along with the applicable standard(s), can be found in Appendix A.

Each UL product category code provides a direct link to the Guide Information for the product category. The Guide Information includes the scope of the products covered, information relating to limitations or special conditions applying to the product, the requirements used for the investigation of the products, installation and use information, and information on product markings and the UL Mark to be used on the product. Guide information is available in the UL White Book and online at www.ul.com/database.

The product markings identified in this guide do not include every possible marking that could be provided either on a product or in its installation or operation instructions. The purpose of these markings is to provide you with an indication of the type of text and location of markings that address features that may be critical in determining if a product is certified and / or if it is installed correctly. Refer to the specific Guide Information for the product category for additional marking information.

The numbering for code sections used in this document may change as the specific code is updated. A list of model codes and standards applicable for each product can be found in Appendix B.



Additional information can be found at www.ul.com/renewable.

INFORMATION ON LISTING VERSUS CLASSIFICATION

Most codes and regulations require the certification of this equipment to applicable safety-related standards. They also may require this equipment to be certified to energy performance standards as well. Products that are certified to safety-related standards have been evaluated with regard to all reasonably foreseeable safety-related hazards, including fire, electrical shock and mechanical hazards. Such products are termed “UL Certified” or “UL Listed.” Products that are certified to a limited range of hazards, or for use under specific conditions are termed “UL Classified”.

It is important to distinguish the difference between “UL Certified” or “UL Listed” and “UL Classified” and the relation these terms have with the term “listed,” as used in various codes. The term “listed” in the codes generally indicates that the product is required to be evaluated in accordance with the appropriate standard(s) by an independent third party certification organization such as UL. The term “listed” in the codes should not be confused with the term “UL Listed,” as explained above. It is important to recognize that not all certification agencies make this distinction in their certification services.

INFORMATION ON UL MARKS

There are several types of UL Marks that can be found on alternative energy equipment. General information on each of these Marks is provided below. Each has its own specific meaning and significance. The only way to determine if a product has been certified by UL is to look for the UL Mark on the product itself.

The UL Mark on a product means that UL has tested and evaluated representative samples of that product and determined that they meet the requirements in the applicable standard(s). Under a variety of UL programs, certified products are periodically checked by UL at the manufacturing facility to determine that they continue to comply with the standard(s).

The UL Marks may only be used on, or in connection with products certified by UL, and under the terms of a written agreement between the manufacturer and UL.

UL Listing Mark

This is one of the most common UL Marks. If a product carries this Mark, it means UL found that representative samples of this product met UL's *safety* requirements. These requirements are primarily based on UL's own published Standards for Safety, or other recognized third party standards. The UL Listed Mark includes the UL symbol, the word "Listed," the product or category name, and a control number assigned by UL.



UL Classification Mark

This Mark appears on representative samples of products that UL has evaluated but only with respect to specific properties, a limited range of hazards, or suitability for use under limited or special conditions. The UL Classified Mark includes the UL symbol, the word "Classified," a statement of the scope of evaluation, the product or category name, and a control number assigned by UL.



PV Global Approval Mark (GAP)

Although this certification may be issued in conjunction with a safety certification, this certification is not considered a safety certification. This certification is for design qualification and type approval of PV modules and panels in accordance with IEC 61215 and IEC 61646.

This Mark is for photovoltaic (PV) products that have only been evaluated for an extension of the CB Full Certification Scheme (CB-FCS) based on authorization from the International Electrotechnical Commission's System for Conformity Testing and Certification of Electrical Equipment and Components (IECEE). In addition to the CB Certification under the CB-FCS program, ISO 9000 registration and an ongoing product follow-up surveillance program are required. UL is a member of the IECEE, and is a National Certification Body (NCB).

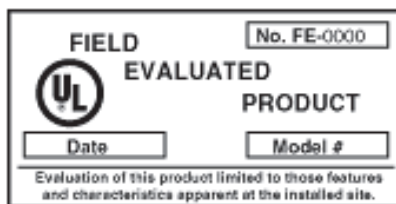
For more information, refer to the Guide Information for “Photovoltaic Modules and Panels – PV GAP Mark” (QIMY) or “Photovoltaic Lanterns – PV GAP Mark (QIMV).



PV GAP QUALITY MARK

FIELD EVALUATIONS

You may encounter situations in which you are unable to determine if a product has been listed by a third-party organization. Or in other situations you might encounter a product bearing a listing label that may have been modified in the field, and now you question whether or not the product still complies with the applicable standard. UL offers a field evaluation service that provides data to assist you in making your decision whether to accept the product and/or approve the installation. Anyone directly involved with a product – including manufacturers, owners, contractors, and regulatory authorities – can request a Field Evaluation. Detailed information for this program can be found on UL’s Web site at www.ul.com/field.



1. ALTERNATIVE ENERGY EQUIPMENT AND SYSTEMS

Alternative energy is either distributed or localized generation. The power source of alternate energy equipment and systems is one of the following or a hybrid combination – photovoltaic panels, wind turbines, engine generators, microturbines, or fuel cells. There are three system types:

- Interactive – operates in parallel with and may deliver power to an electrical production and distribution network
- Hybrid – comprised of multiple power sources
- Stand alone – supplies power independently of an electrical production and distribution network

The main concerns regarding the installation and use of distributed or localized generation are safety, power quality, harmonic distortion, and “islanding”. “Islanding” is when the distributed generation equipment continues to feed power to the grid when the utility source has been disconnected, resulting in sourcing an “island” or part of the grid. Installation requirements for interconnection with electrical power production sources are covered by NEC Article 705.

Inverters and converters (QIKH)

An inverter provides AC power at a useable voltage and frequency for connection to the utilities' electric power grid or to provide power for off-grid loads. In general, it converts the output of photovoltaic panels, fuel cells, wind turbines, and microturbines to an appropriate AC voltage and frequency for direct domestic and industrial use. More complex units can also supply power with the proper characteristics to the utility grid.

A converter is a device that accepts AC or DC power and converts it to another form of AC or DC power for direct utilization by a load or accumulation in an energy storage system.

Tests are conducted in accordance with the requirements of UL 1741. The extent of the test work depends on whether the product is a stand-alone unit or intended for interconnection with the local utility. The standard addresses the risks of fire and shock to service personnel and the general public. Inverters and converters for RV and land vehicles use (QPPY) and marine use (QPQL) are investigated using ANSI/UL 458.

There are three classes of inverters:

- Utility interactive – operate in parallel with, or backfeed power to the utility grid to supply common loads
- Stand alone – supply power to loads independent of the utility grid
- Multimode – can operate in both utility interactive and stand-alone modes in case of utility failure.

For inverters identified as utility interactive, the standard addresses power quality, synchronization of power back into the grid, and anti-islanding protection. The utility-interactive inverters prevent the exportation of power after a utility outage in order to mitigate potential shock hazards to utility line crews, current contribution to the utility fault, potential problems in re-energizing the power lines, and damage to equipment if the power line is re-energized out of sync with the inverter.

Markings on inverters include the following:

- The name of the manufacturer and the model number
- Range of input operating voltage
- Maximum input current (AC or DC)
- Output power factor rating
- Operating voltage range (AC)
- Operating frequency range or single frequency
- Nominal output voltage (AC)
- Normal output frequency
- Maximum continuous output current (AC)
- Maximum continuous output power (AC)
- Maximum ambient temperature rating (if evaluated for higher than 25°C / 77° F)
- Installation environment (e.g. “indoor use only”)
- “Utility-Interactive” or “Interconnection System Equipment” if appropriate

The model ratings for each inverter are posted on UL’s Online Certification Directory. Some inverters need to be installed and operated with an external transformer and/or overcurrent protection (input or output), as specified in the markings and installation instructions. The required external overcurrent protection is to be sized at 125% of the inverter’s output current rating unless otherwise specified.

Installation instructions for inverters identify the wire size, wire type, wire rating, location limitations of the product, clearances, torque values for the wire terminals, and the electrical ratings.

Distributed Resource Power Systems (QI/L)

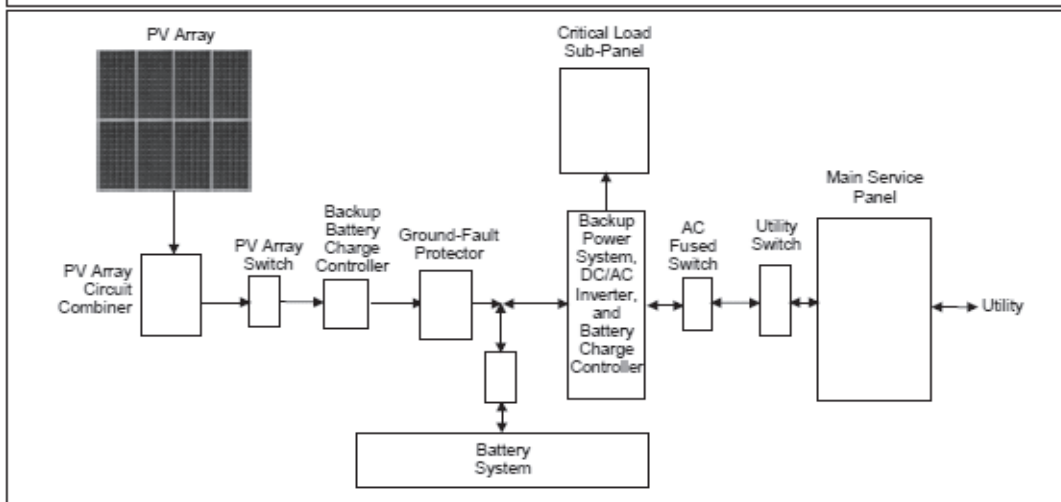
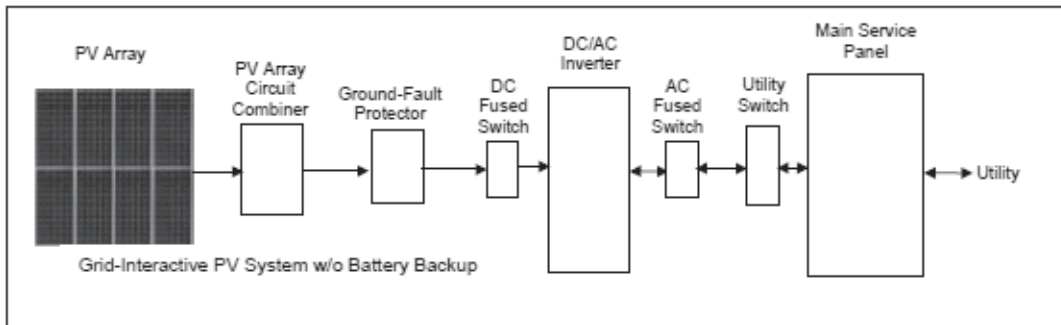
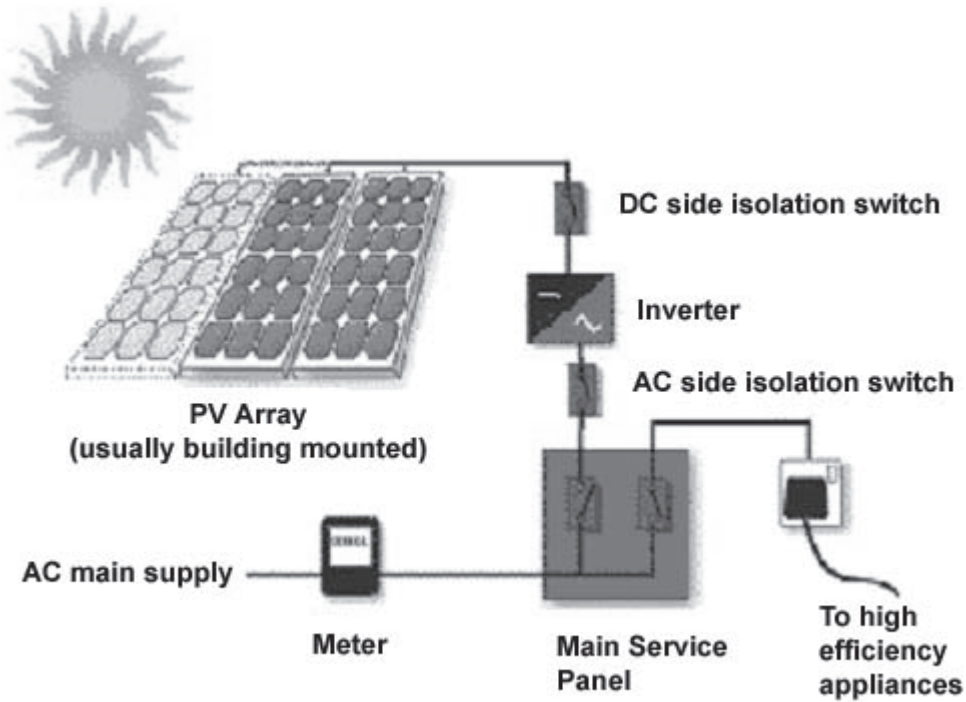
Distributed resource power systems, consisting of combinations of batteries, energy storage devices, utility interconnection systems equipment, and protective relays, are investigated in accordance with applicable requirements from UL 1703, UL 1741, and ANSI/UL 2200. This combination of equipment is intended to combine, convert, transform or relay energy from one or more ac or dc sources for use in stand-alone and/or utility-interactive power systems. They are factory or field wired assemblies in which the combination has been investigated for operation as a system assembly when installed in accordance with the installation instructions.

Solar Power

There are two types of solar power – photovoltaic and thermal. Photovoltaic converts light directly into electricity using semi-conductor technology. Thermal solar uses the sun’s radiation to heat water for buildings and swimming pools.

2. PHOTOVOLTAIC SYSTEMS

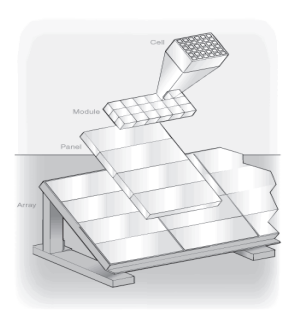
Photovoltaic (PV) technologies use treated crystalline silicon operating as a semiconductor to generate a flow of direct current electricity when exposed to light. PV technologies are evolving, allowing PV use in products such as flexible roofing applications and using other materials such as thin-film polymer.



Photovoltaic (PV) systems convert sunlight directly into electricity, which enables the generation of some or all of the daily electrical energy demand for a building. Utility interactive systems remain connected to the electric utility at all times, so any power needed above what the solar system can produce is simply drawn from the utility. PV systems include mounting systems and wiring systems used to integrate the solar modules into the structural and electrical systems of the building. The wiring systems include disconnects for the dc and ac sides of the inverter, ground-fault protection, combiner boxes, and overcurrent protection for the solar modules. Some inverters include this fusing and combining function within the inverter enclosure. PV systems can also include battery backup or uninterruptible power supply (UPS) capability to operate selected circuits in the building for hours or days during a utility outage.

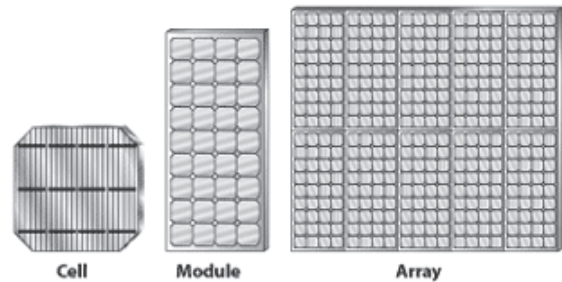
Product installation concerns for photovoltaic systems include:

- Utility compatibility and interaction
- Environment (e.g. indoor, outdoor, hazardous location)
- Maximum number of modules (effecting voltage/current/short-circuit)
- Fire exposure ratings (effect on roof covering)
- Wind and snow loading
- Mounting and attachment
- Grounding and bonding
- Shading



Modules and Panels

A PV module consists of solar cells connected together in the factory. The most common PV module is 5 to 25 ft². PV modules have ratings from 12V to 100V and power ratings from 5w to 400w. Often sets of four or more smaller modules are framed or attached together by struts in what is called a panel. This panel is typically around 20-35 ft² in area. This allows some assembly and wiring functions to be done on the ground in the factory or in the field in accordance with the installation instructions.



PV panels are "strung" together in series, referred to as a PV array, to increase the voltages from 120Vdc up to 600Vdc. Under normal conditions the current of these strings is usually from 5 to 10 amps. The NEC limits residential PV maximum system voltage to 600Vdc. PV panels can also be connected together in parallel to increase the current.

The construction of the product, the safety performance, materials and the manufacturing process are all assessed in determining the compliance of the module or panel to the requirements of the applicable standards. The product's output wiring system is also investigated for conformance with the conventions of the NEC. The safety performance includes electrical, temperature, mechanical loading, and fire tests.

AC modules (QHYZ) provide single-phase power at 50/60 Hz when exposed to sunlight. An AC module consists of a photovoltaic module and an integral static inverter that changes dc power to ac

power. AC modules may be connected in parallel and are intended for operation interactive with an electric utility supply. They have been evaluated to de-energize their output upon loss of utility power. These modules are rated up to 600 V dc input; 10 kW, 120/240 V ac or less, single-phase output. The basic standards used to investigate these modules are UL 1703 and UL 1741.

PV modules and panels (QIGU) intended to be connected to electrical loads, controllers, or to static inverters that convert the dc power the modules or panels generate to other types of power compatible with the intended loads are investigated using UL 1703. Flat-plate PV modules and panels rebuilt (QIGZ) by the original manufacturer or a third party manufacturer are subject to the same requirements as new flat-plate photovoltaic modules and panels. PV modules and panels for use in hazardous locations (FCJU) are identified with the aforementioned ratings and Class and Division ratings.

Concentrator Photovoltaic (CPV)

Concentrator photovoltaic modules and assemblies (QICP) use lenses and reflectors to concentrate sunlight on photovoltaic cells to increase output power. The installation class for CPV modules and assemblies identifies the intended installation location as either general access areas designated "General," or restricted access areas designated "Restricted." General access units are able to be installed in open areas that may be contacted by the general public. Restricted access units are intended to be installed in areas that prevent general public access, such as a locked and fenced-in area. The basic requirements used to investigate products in this category are contained in UL Subject 8703.

PV modules and panels are intended for mounting on buildings or on ground-supported frames. Roof-mounted modules or panels are investigated for one of three mounting methods: (1) integral to the roof of a building, (2) directly on a building's roof, or (3) on a rack with a space above the roof surface.

When mounted integral to a building's roof the module (also know as BIPVs) serves as the waterproof membrane. Direct-mounted panels are placed upon the building's waterproof membrane, such as roofing shingles. Rack-mounted styles are spaced away from the building's roof membrane. Rack-mounted styles may also be installed separate from buildings. Installation of modules on or integral to a building's roof system may or may not adversely affect the roof-covering materials' resistance to external fire exposure if the module has a lesser or no fire-resistance rating. Roof-covering materials will not be adversely affected when the modules have an equal or greater fire-resistance rating than the roof-covering material.

PV modules or panels are additionally identified as Class A, B or C to denote their Classification for resistance to external fire exposure to correlate with the rating of other roofing materials and systems as required by the International Building Code (IBC) Chapter 15. Rack-mounted modules or panels that have not been identified with respect to their resistance to external fire exposure are marked "Not Fire Rated." Photovoltaic roofing shingles (TFXX) are intended to be applied directly to a combustible deck in accordance with manufacturer's instructions. Roofing systems (TGFU) that are an assembly of several components, including the PV modules and panels, may require special equipment for application and are intended to be installed on a roof deck as specified by the system.

Building-Integrated Photovoltaic (BIPV)

Building-integrated photovoltaic modules and panels (QHZZ) are intended for mounting integrally to the structural or protective surfaces of a building in one of three primary installation methods: (1) to serve as the roof, or as a majority component of the roofing system of a building (TFXX, TGFU), (2) to serve as part of a structural component of a building, such as a curtain-wall, facade, atrium, skylight, etc., or (3) to serve as part of a nonstructural component of a building, such as a curtain-wall, facade, atrium, skylight, etc., which is applied extant to the primary building structure. These modules and panels and their mounting systems (QHZZ) are investigated using UL 1703, and ANSI/UL 790 and UL 997 as appropriate.

PV Markings and Installation Instructions

Markings for PV modules and panels include:

- Electrical ratings - $V_{Open\ Circuit}$, $V_{Operating}$, $V_{Max\ System}$, $I_{Short\ Circuit}$, I_{Rated} , P_{max}
- Terminal polarity and temperature of output connections
- Maximum series overcurrent device rating
- Minimum acceptable diode bypassing (if needed)
- Fire Rating – “Not Fire Rated” or Class A, B, or C

Grounding and bonding of the panels and modules and racking systems are required to be done in accordance with the manufacturer’s installation instructions, due to concerns of dissimilar metals and exposed terminations.

The installation instructions for the PV modules and panels include:

- Max. System Voltage (to not exceed the inverter)
- Wire sizing
- Maximum series fuse rating (dc rating)
- Electrical Data - V_{oc} , I_{sc} , Temperature, V_{mp} , I_{mp} , P_{max}
- Grounding methods & location
- Clearances to roof for rack-mounted
- Designation of attachment

Model code requirements for photovoltaic systems are found in the National Electrical Code (NEC®) Article 690; International Building Code (IBC) Chapters 15, 16, and 24; and Uniform Solar Energy Code (USEC) Chapter 10.

The standards IEEE 1262, IEC 61215, and IEC 61646 are used for design qualification of modules and panels (QIMY). This is not a safety certification.

PV Accessory Equipment

PV accessory equipment (QIIO) include:

- Actuators
- Blocking diodes
- Conduit boxes

- Connectors
- Controllers (control boxes)
- Communication modules
- Disconnects
- Distribution panels
- Transition boxes

Most systems include a combiner box since most modules require fusing for each module source circuit. Manufacturer’s installation instructions for combiner boxes include:

- Wire size
- Terminal Ratings and torque values
- Mounting orientation / Location
- NEMA enclosure rating

A charge controller (QIBP) is a device to control the charging process of energy storage products such as batteries. These devices are necessary to match the output voltage of the DG source with the rated voltage of the battery or other storage medium. They also control the level and rate of charge to prevent damage to the storage medium.

An output controller is a device external to an inverter, converter or utility interactive distributed generation source that performs utility interface functions including over- and under-voltage, over- and under-frequency, synchronization, and anti-islanding protection.

PV panels are inherently limited sources and are not provided with direct output overcurrent protection. They are designed to operate within 20% of the short circuit current. The NEC® Section 690.5 requires a means to detect a ground fault in the PV system caused by abuse, wear, cutting, and pinching of the wire. Ground fault detector interrupters (QIIO) interrupt the flow of fault current, and provide an indication of the fault. Inverters and controllers either incorporate these devices or are marked to require these devices to be added in the field.

PV Wire (ZKLA)

A new wire has been specifically designed for interconnection wiring of grounded and ungrounded photovoltaic power systems as described in NEC® Section 690.31(A). The Photovoltaic Wire is a single-conductor, insulated and integrally or non-integrally jacketed, sunlight resistant, rated 90, 105, 125 or 150°C dry, and 90°C wet, 600, 1000 or 2000 V. The basic requirements used to investigate the wire is UL Subject 4703. The wire is labeled “Photovoltaic Wire”.

Connecting to Panelboards and Switchboards

Panelboards and deadfront switchboards are not Listed to have their busbars tapped unless there are existing holes in the busbars marked with the word “Tap” adjacent to the holes. Other holes in the busbar that are not marked with the word “Tap” are intended for the connection of overcurrent devices, other device’s as identified by the product markings and in the installation instructions or other uses identified by the manufacturer. When the electrical equipment Listing does not include product markings or instructions for tapping busbars, this situation should be treated like any other field modification of Listed equipment.

Some Listed power equipment may have installation instructions with specific directions on tapping the busbars. If this is the case, this equipment can be field modified, following those manufacturer’s

instructions, in accordance with the National Electrical Code® (NEC) Section 110.3(B). The UL White Book identifies the required markings for field-installed equipment that have been evaluated by UL. For additional information, please see the guide information for panelboards (QEUY) and for dead-front switchboards (WEVZ).

If not addressed in the installation instructions, any modifications must be evaluated by the Code Official according to NEC Section 110.3(A) or by having a UL Field Evaluation conducted. A terminal or provision for a terminal in a panelboard or switchboard which has been evaluated for use as a tap, other than those to be used by the supply utility for voltage metering pick-up, are marked "Tap" in the factory. Drilling or enlarging holes in busbars can increase the current density and reduce current carrying capacity. Some equipment is constructed with fully rated busbars, which have a typical current density of 1000 A per square inch of cross sectional area for copper and 750 A per square inch of cross sectional area for aluminum. However, some equipment uses busbars at a higher current density and have temperature testing conducted to determine compliance with UL's requirements.

Removing busbar material can result in higher operating temperatures, and additional holes can potentially weaken the busbar, which adversely affects the short circuit rating of the equipment required by NEC Section 110.10. Both sufficient wiring space and wire bending space need to be provided for the conductors and the wire connector at the tap connection. In measuring the wiring space, code officials need to consider the possibility of the connectors rotating, which may result in reduction of the spacing between uninsulated live parts of opposite polarity and uninsulated live parts and ground.

Wire connectors (lugs) need to be Listed for the purpose and have the proper ratings for specific application, and the mounting hardware for wire connectors needs to be properly selected and attached with the correct torque. The potential reduction of required spacings from the wire connectors or fasteners to the enclosure or other busbars also needs to be evaluated. In completing the modification, all foreign material such as cutting oil, burrs and metal shavings needs to be removed from the equipment enclosure. Temporarily removed materials such as insulating barriers need to be returned to their original positions and secured. The above are just a few of the concerns and items that must be inspected, checked and reviewed where such modifications are made to this type equipment.

3. THERMAL SOLAR SYSTEMS

Thermal solar systems involve direct utilization of solar energy for space heating, space cooling and/or water heating systems. The basic requirements used to investigate products in these systems are contained in UL Subject 1279.

UL's Solar Energy Systems Equipment product categories are:

- Solar Energy Systems Equipment (UZST)
- Controllers, Electrical, Solar (UZVY)
- Thermal Storage Units, Solar (UZWW)
- Water Heaters, Solar (UZWZ)
- Collectors, Solar (UZUW)
- Energy Transfer Units, Solar (UZWT)
- Radiant Heating Hose (MEKC)

Product installation concerns include:

- Environment (unless evident for outdoors or marked as such, indoor use only)
- Type of storage media or fluid
- Max temperature and pressure ratings
- Roof classification
- Mounting methods

Applicable installation codes and standards are UMC Chapter 15; IMC Chapter 14; IBC Chapters 15, 16, and 26; and USEC. The codes include specific requirements for roof mounting of the collectors, heat transfer fluids, and equipment and materials.

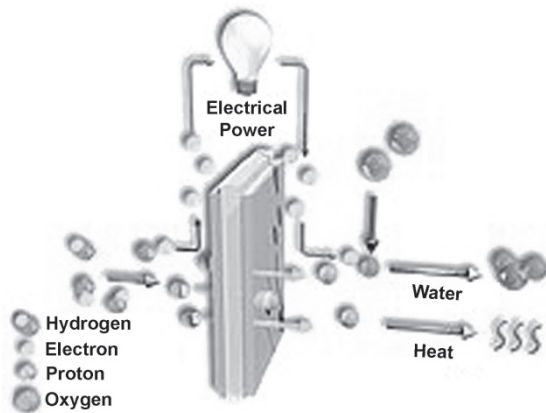
Using solar for thermal heating provides credits in various green building codes and standards, such as Section 704.3.2 of ICC 700.

4. FUEL CELLS AND HYDROGEN GENERATORS

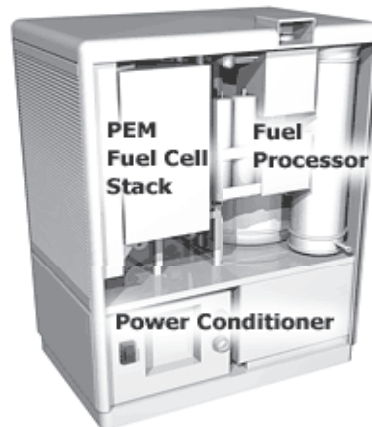
A typical Fuel Cell is an electrochemical device that converts hydrogen into electrical energy and heat. Current technologies are the proton exchange membrane fuel cell (PEMFC), the phosphoric-acid fuel cell (PAFC), the solid oxide fuel cell (SOFC), and the molten carbide fuel cell (MOFC).

The technology is broad and includes a wide variety of applications. Currently, UL evaluates stationary fuel cells used as electric power sources for residential and commercial and backup voltage sources for uninterruptible power supplies for critical computer and telephone applications (IRGZ), portable battery replacement power sources for cell phones and other electronic equipment (IRGU), battery replacement power sources for industrial trucks (IRGQ), Additionally, fuel cells are beginning to be used by the utility companies as a source of supplemental power during periods of peak demand.

A basic summary of a fuel cell power system is that it consists of either a reformer to extract hydrogen from fuel or can be supplied with a direct source of hydrogen, a fuel cell, and power conditioning circuitry which may include an inverter. Applicable codes and standards are NFPA 853, NEC Articles 692 and 705, CSA FC-1, UL Subject 2262, UL Subject 2265A, UL Subject 2265C, ANSI/UL 2267, UL 1741, IFGC Section 633, IMC Section 924, and UMC Chapter 16.



PEM Fuel Cell technology



5. ENGINE GENERATORS AND MICROTURBINES

Microturbine and engine generator products are electricity-producing assemblies typically located at or near the point of use. They are typically installed so that back-up (standby or emergency) power is available to the user in the event of a utility grid failure. In some installations, these units can be connected in parallel with the local electric utility power grid and used for peak shaving or excess power can be sold back to the utility. In other applications, microturbines and engine generators are located off the grid in rural and remote areas where they provide the sole source of power (prime or continuous), or they operate in combination with other sources such as photovoltaic or wind turbine installations.

Internal combustion gasoline, natural gas, propane and diesel engines from the automotive and marine industries have been coupled to rotating field alternator and generator devices for many years. In addition, the turbine engines now being coupled to high-speed generators in microturbine applications are from the same family of small jet engines that have been employed in the military and transportation industries for the past 50 years. These systems are considered to employ the most reliable power producing technologies ever used in stand-alone and distributed systems.

Tests for stationary engine generators are conducted in accordance with the requirements of UL 2200, which include an evaluation of fire hazards, electric shock hazards, casualty hazards (including power interruption consequences) and reliability analysis. Additional tests may be conducted based on NFPA 110 and to deal with special situations such as the evaluation to show that abnormal leakage is handled appropriately, or gas component sections of the product are ventilated as designed.

Tests for portable engine generators are conducted in accordance with UL 2201. The electrical evaluation includes control panels, safety control reliability analysis, cycling durability tests, circuit analysis, and system software. The mechanical evaluation includes fuel tanks, venting, and the combustion engine.

Model installation code requirements for engine generators are covered in IFGC Section 616, IMC Section 915, IBC Section 2702, IFC Section 604 NFPA 37, NFPA 99, and NFPA 110.



6. WIND TURBINE GENERATING SYSTEMS

Large and small wind turbine generating systems and assemblies (ZGAA)



Wind turbine generating systems produce electric power from a wind driven generator. Wind turbines consist of blades, hub, generator, drive train, support structure, control, power collection, power distribution and protection systems. Small wind turbine generating systems (ZGEN) are defined as wind turbines with a rotor swept area of 200 m² (16 meters rotor diameter) or less, and an output terminal voltage of 600 Volts or less. Large wind turbine generating systems (ZGEA) are defined as turbines with a rotor swept area larger than 200 m² (16m rotor diameter). Large Wind Turbine Assemblies (ZGBP) and small wind turbine sub-assemblies (ZGZJ), consisting of various electrical hardware components and subassemblies constructed and interconnected in accordance with electrical safety requirements, are used to create a complete wind turbine.

These systems are evaluated for risk of fire and shock, including safety related control system electrical performance and utility grid-interconnect performance for Utility Interactive models. The basic requirements used to evaluate large and small wind turbine generating systems, and large and small wind turbine assemblies, and safety related control systems, is Subject 6140-1, UL's "Outline of Investigation for Wind Turbine Generating Systems".

The electrical equipment systems are intended for installation in accordance with the requirements in NEC[®] Article 705. Mounting means, support structures, wind turbine blades, and/or rotors are only evaluated to the extent that they include the necessary electrical components to comply with the applicable electrical safety standards. Local wind, snow, and seismic loading, and local soil conditions are unique for each jobsite location, and thus should be evaluated by the local jurisdiction.

Safety Related Control Systems (ZGCP)

Safety Related Control Systems consist of electrical hardware and software which operate to control and protect the wind turbine generating system, and functions up to the electro-mechanical interface of the associated power and control circuits. These systems are for use with specific wind turbine generating systems as defined by each product's UL Classification.

These systems are evaluated to perform specific wind turbine control and protection functions to maintain the overall system within the manufacturer's specified operational limits. These control and protection functions are evaluated with respect to risk of electric shock and fire, and electrical response time. It is intended that the electrical subassemblies that address power transfer control and protection functions evaluated by UL be coordinated with a mechanical and structural

evaluation of the wind turbine generating system in accordance with standards such as the IEC 61400 series documents or Germanischer Lloyd WindEnergie GMBH: Guideline for the Certification of Wind Turbines documents.

The Safety Related Controls System, as defined in UL Subject 6140, embodies the “Controls System” and “Protection System” functions defined in IEC 61400 and Germanischer Lloyd WindEnergie GMBH: Guideline for the Certification of Wind Turbines documents, GL-IV.

Inverters and Converters (ZGFA)

Inverters are devices that change DC power to AC power. Converters are devices that accept AC or DC input power and convert it to another form of AC or DC power for direct utilization by a load or accumulation in an energy storage system (batteries, capacitors, etc.).

Both of these devices are classed as Utility Interactive, Stand-alone or Multimode. Utility Interactive devices operate in parallel with the utility grid. Stand-alone devices are intended to operate independent of the utility grid. Multimode devices can operate as both or either Stand-alone (utility independent) or Utility Interactive devices. Each product is marked to identify its class.

Electric utility grid interconnection performance is evaluated to limits defined by the manufacturer for synchronization, overvoltage, undervoltage, overfrequency, underfrequency, clearing times, reconnect time, power factor, DC injection, harmonic distortion, unintentional islanding, power range and low voltage ride-through (if provided).

Inverters and converters may contain energy storage devices and associated charge controllers. Some devices must be installed and operated with an external transformer. Such devices are provided with markings and instructions to indicate the type of transformer required. Some devices may require external input and / or output overcurrent protection, which will be specified in product markings and installation instructions.

Some devices in this category must be installed and operated with an external transformer. Such devices are provided with markings and instructions to indicate the type of transformer required. These products may require external output overcurrent protection, which will be specified in product markings and installation instructions.

The basic requirements used to evaluate inverters and converters is UL Subject 6141, which requires that all converters be evaluated for both normal and abnormal conditions associated with the application (less electric utility “grid” interconnection protection). For electric utility connected converters this includes the evaluation of the unit’s ability to parallel two sources of power, operate during normal utility operating conditions, provide a minimum level of output power quality including DC injection and operate safely during abnormal utility grid conditions defined by the manufacturer’s specified product ratings.

Products that have not been evaluated for electric utility “grid” interconnection protection will be marked to indicate that the electric utility grid interconnection protection functions have not been evaluated and need to be addressed at the end installation with the local utility AHJ per local codes and standards. This will often require the installation of additional electric utility interconnection protection equipment and field-testing per the local utility interconnection requirements.

APPENDIX A

UL ALTERNATIVE ENERGY PRODUCT CATEGORIES

UL does list this type of equipment and continues to develop new product categories to address the safety issues associated with this type of equipment. Below is a list of product categories that UL currently lists to address these types of products. Each product category is tabulated with a UL Category Code. By clicking on the code, you will be linked to the UL Guide Information for the category and any Listings or Classifications under that Product Category in the UL Online Certifications Directory database at www.ul.com/database.

Category Code	Category Name	Standard Used
QHWJ, FCHD	Distributed generation power systems equipment	
QIKH	Static Inverters and Converters for Use in Independent Power Systems	UL 1741
QPPY	Power Converters/Inverters and Power Converter/Inverter Systems	UL 458
FFZS	Power Converters for Use in Electric Land Vehicles	UL Subject 458A
QPQL	Converter and Inverter Systems -- Marine	UL 458
QIIO	Distributed Generation Power Systems Accessory Equipment	UL 1741
QIJL	Distributed Resource Power Systems	UL 1703, UL 1741, and/or UL 2200
BBFX	Batteries for Use in Light Electric Rail and Stationary Applications	UL Subject 1973
	Photovoltaics	
QHYZ	AC Modules	UL 1703 and UL 1741
QIGU	Photovoltaic Modules and Panels	UL 1703, IEEE 1262
QIIA	Photovoltaic Modules and Panels with System Voltage Ratings Over 600 Volts	UL 1703
QIGZ	Remanufactured Photovoltaic Modules and Panels	UL 1703
FCJU	Photovoltaic Modules and Panels for use in Hazardous Locations	UL 1703
QICP	Concentrated Solar Power Equipment	UL Subject 8703
QIHC	Concentrator Photovoltaic Modules and Assemblies Classified in Accordance with IEC 62108 and/or CEI 82-85	IEC 62108, CEI 82-85
QIHS	Photovoltaic Modules and Panels Classified in Accordance with IEC 61646 and/or EN 61646	IEC 61646 and/or EN 61646
QIHZ	Photovoltaic Modules and Panels Classified in Accordance with IEC 61730-1 and 61730-2 and/or EN 61730-1 and 61730-2	IEC 61730-1 and 61730-2 and/or EN 61730-1 and 61730-2
QIHO	Photovoltaic Modules and Panels Classified in Accordance with IEC 61215 and/or EN 61215	IEC 61215 and/or EN 61215
QHZK, TFXX, TGFU	Building-Integrated Photovoltaic Modules & Panels	UL 1703, UL 790, UL 997

QHZZ	Building-Integrated Photovoltaic Mounting Systems	UL 1703, UL 790, UL 997
QHZZ	Flat-plate, Low-concentration Photovoltaic Modules and Panels	UL Subject 8703 or UL 1703
QIBP	Photovoltaic Charge Controllers	UL 1741
FCJC	Photovoltaic Charge Controllers for Use in Hazardous Locations	UL 1741
QIKA	Photovoltaic Solar Trackers	UL Subject 3703
QIMS	Rack Mounting Systems and Clamping Devices for Flat-plate Photovoltaic Modules and Panels	UL Subject 2703
ZKLA	Photovoltaic Wire	UL Subject 4703
QIMV	Photovoltaic Lanterns – PV GAP Mark	
QIMY	Photovoltaic Modules and Panels – PV GAP Mark	IEC 61215, IEC 61646
IZMR	Fuseholders, Photovoltaic	UL Subject 4248-18
JFGA	Fuses for Photovoltaic Systems	UL Subject 2579
DIUR	Circuit Breakers, Molded Case and Circuit-breaker Enclosures for Use in Photovoltaic Systems	UL Subject 489B
QIDC	Photovoltaic DC Arc-fault Circuit Protection	UL Subject 1699B
WHXX	Switches, Dead-front for Use in Photovoltaic Systems	UL Subject 98B
WIBC	Switches, Enclosed for Use in Photovoltaic Systems	UL Subject 98B
WJBE	Switches, Molded Case, for Use in Photovoltaic Systems	UL Subject 489B
WHVA	Switches, Open Type for Use in Photovoltaic Systems	UL Subject 98A and UL Subject 98B
UZST	Thermal Solar - Solar Energy Systems Equipment	
UZUW	Solar collectors	UL Subject 1279
UZVY	Electrical solar controllers	UL Subject 1279
UZWT	Energy transfer units	UL Subject 1279
UZWW	Thermal storage units	UL Subject 1279
UZWZ	Solar water heaters	UL 174, UL 1453
IRGN	Fuel Cells and Hydrogen Generators	
IRGQ	Industrial trucks	UL 2267
IRGU	Handheld fuel cells	UL Subject 2265A or UL Subject 2265C
IRGZ	Stationary fuel cells	ANSI/CSA FC-1
NCBR	Hydrogen generators	UL Subject 2264B
FTCA	Engine Generators and Microturbines	
FTSR	Stationary Engine Generators	UL 2200
FTPU	Engine Generators fueled by biogas or raw natural gas	UL 2200
FTWG	Stationary Engine Generators for use in Hazardous Locations	UL 2200
FTCN	Portable Engine Generators	UL 2201
FTCZ	Engine Generators for use with Recreational Vehicles	UL 1248
EFVT	Special purpose tanks	UL 142, UL 2085,

		UL 2080
FTVV	Engine control equipment and Engine Generators for Use in Hazardous Locations	
FTWD	Engine controls for Use in Hazardous Locations	UL 508, UL 61010-1, UL 6200
FTWL	Ignition controls for Use in Hazardous Locations	UL 1012
JZGZ	Generator heads	UL 1004-1, UL 1004-4
IUXX	Fuel Gas Booster Compressor Equipment	UL 2200
ZGAA	Wind Turbine Generating Systems	
ZGEA	Large wind turbine generating systems	UL Subject 6140
ZGBP	Large wind turbine assemblies	UL Subject 6140
ZGEN	Small wind turbine generating systems	UL Subject 6140
ZGZJ	Wind turbine sub-assemblies	IEC 61400-1 or IEC 61400-2
ZGTA	Wind Turbine Tower Assemblies	UL Subject 6140
ZGDT	Wind Turbine Drive-train Systems and Equipment	UL Subject 6141
ZGCP	Safety-related control systems	UL Subject 6140
ZGFA	Inverters/converters	UL Subject 6141
ZGZN	Wind turbine tray cable	UL Subject 2277

APPENDIX B: ALTERNATE ENERGY CODES AND STANDARDS

Alternative energy equipment must be installed in accordance with model codes and installation standards. These codes require these products to be listed and labeled in accordance with applicable product standards.

UL standards are typically identified as Standards for Safety and cover reasonably foreseeable risks associated with a product. Limitations applicable to the products covered by the standard are delineated in the Scope section of the standard. UL standards are intended to:

- Identify requirements for evaluation of products and provide consistency in the application of these requirements.
- Provide guidance for development of products by manufacturers.
- Provide requirements compatible with nationally recognized installation codes

An UL Outline of Investigation is a document that contains the construction, performance, and marking criteria used by UL to investigate a product when the product is not covered by the scope of an existing UL Standard for Safety. Outlines are not consensus documents and do not require review by an UL Standards Technical Panel (STP) or other external group.

CEI 82-25	Guide for Design and Installation of Photovoltaic (PV) Systems Connected to MV and LV Networks
CSA FC-1	Standard for Stationary Fuel Cell Power Systems
EN 61215	Crystalline silicon terrestrial photovoltaic modules - Design qualification and type approval
EN 61646	Thin-film terrestrial photovoltaic modules - Design qualification and approval
EN 61730-1	Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements for Construction
EN 61730-2	Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements for Testing
IBC	International Building Code
ICC 700	National Green Building Standard
IFC	International Fire Code
IFGC	International Fuel Gas Code
IGCC	International Green Construction Code
IMC	International Mechanical Code
IEC 61215	Crystalline silicon terrestrial photovoltaic modules - Design qualification and type approval
IEC 61646	Thin-film terrestrial photovoltaic modules - Design qualification and approval
IEC 61730-1	Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements for Construction
IEC 61730-2	Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements for Testing
IEC 62108	Concentrator Photovoltaic (CPV) Modules and Assemblies - Design Qualification and Type Approval
IEEE 1262	IEEE Recommended practice for qualification of photovoltaic (PV) modules

IEEE 1547	IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems
NEC (NFPA 70)	National Electrical Code
NFGC (NFPA 54)	National Fuel Gas Code
NFPA 1 (UFC)	Uniform Fire Code
NFPA 37	Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
NFPA 54 (NFGC)	National Fuel Gas Code
NFPA 70 (NEC)	National Electrical Code
NFPA 99	Standard for Health Care Facilities
NFPA 110	Standard for Emergency and Standby Power Systems
NFPA 853	Standard for the Installation of Stationary Fuel Cell Power Plants
UL 98A	Outline of Investigation for Open-Type Switches
UL Subject 98B	Outline for Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
UL 458	Standard for Safety of Power Converters/Inverters and Power Converter/Inverter Systems for Land Vehicles and Marine Crafts
UL Subject 458A	Outline of Investigation for Power Converters/Inverters for Electric Land Vehicles
UL Subject 489B	Outline for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures For Use With Photovoltaic (PV) Systems
UL Subject 508I	Outline for Manual Disconnect Switches Intended for Use in Photovoltaic Systems
UL 790	Standard Test Methods for Fire Tests of Roof Coverings
UL 997	Standard Test Methods for Wind Resistance of Prepared Roof Covering Materials
UL 1004-1	Rotating Electrical Machines - General Requirements
UL 1004-4	Electric Generators
UL 1248	Standard for Safety of Engine-Generator Assemblies for Use in Recreational Vehicles
UL Subject 1279	Outline of Investigation for Solar Collectors
UL Subject 1699B	Outline of Investigation for Photovoltaic (PV) DC Arc-Fault Circuit Protection
UL 1703	Standard for Safety of Flat-Plate Photovoltaic Modules and Panels
UL 1741	Standard for Safety of Inverters, Converters and Controllers for Use in Independent Power Systems
UL Subject 1973	Outline of Investigation for Batteries for Use in Light Electric Rail (LER) Applications and Stationary Applications
UL 2200	Standard for Stationary Engine Generator Assemblies
UL 2201	Standard for Safety of Portable Engine-Generator Assemblies
UL Subject 2262	Outline of Investigation for Portable Proton Exchange Membrane (PEM) Type Fuel Cell Power Plants With or Without Uninterruptible Power Supply (UPS) Features and Portable Proton Exchange Membrane (PEM) Type Fuel Cell Modules for Factory Installation in Original Equipment Manufacturer (OEM) Type Equipment, for Indoor Use
UL Subject 2264B	Outline of Investigation for Hydrogen Generators Using Water

	Reaction
UL Subject 2265A	Outline of Investigation for Hand-held or Hand-Transportable Fuel Cell Power Units with Disposable Methanol Fuel Cartridges for use in Original Equipment Manufacturer's Information Technology Equipment
UL Subject 2265C	Outline of Investigation for Hand-Held or Hand-Transportable Alkaline (Direct Borohydride) Fuel Cell Power Units And Borohydride Fuel Cartridges For Use With Consumer Electronics or Information Technology Equipment.
UL 2267	Standard for Fuel Cell Power Systems for Installation in Industrial Electric Trucks
UL Subject 2277	Outline of Investigation for Flexible Motor Supply Cable and Wind Turbine Tray Cable
UL Subject 2579	Outline for Low-Voltage Fuses - Fuses for Photovoltaic Systems
UL Subject 2703	Outline for Rack Mounting Systems and Clamping Devices for Flat-Plate Photovoltaic Modules and Panels
UL Subject 2736	Outline for Single Pole Separable Interconnecting Cable Connectors for Use with Wind Turbine Generating Systems
UL Subject 3703	Outline of Investigation for Solar Trackers
UL Subject 3730	Outline for Photovoltaic Junction Boxes
UL Subject 4248-18	Outline for Fuseholders - Part 18: Photovoltaic
UL Subject 4703	Outline of Investigation for Photovoltaic Wire
UL Subject 5703	Outline for Determination of the Maximum Operating Temperature Rating of Photovoltaic (PV) Backsheet Materials
UL Subject 6140	Outline of Investigation for Wind Turbine Generating Systems
UL Subject 6141	Outline of Investigation for Wind Turbine Converters and Interconnection Systems Equipment
UL Subject 6142	Standard for Safety for Small Wind Turbine Systems
UL Subject 6703	Outline for Connectors for Use in Photovoltaic Systems
UL Subject 6703A	Outline for Multi-Pole Connectors for Use in Photovoltaic Systems
UL Subject 8703	Outline of Investigation for Concentrator Photovoltaic Modules and Assemblies
UL Subject 9703	Outline for Distributed Generation Wiring Harnesses
UMC	Uniform Mechanical Code
USEC	Uniform Solar Energy Code



Marking and Application Guide

LIGHTNING PROTECTION

Lightning Protection
Marking and Application Guide

JANUARY 2013

PREFACE

With the increased use of sensitive electronic equipment and greater awareness of structural protection, the need for certified lightning protection is increasing. Lightning Protection Systems installed by contractors, can be Listed by UL using the UL96A Standard and information from NFPA 780. The installing contractors use UL listed products based on the UL 96 Standard. Listed products, correct installations in accordance with the standards, combined with a skilled installer can assure that the system will become certified when completed and field evaluated by UL.

The equipment and systems used for lightning protection are required to comply with the electrical code and installation requirements. NFPA 70 and NFPA 780 require compliance with different standards and installation requirements.

UL has developed this guide for use by code and inspection authorities, electric utilities, contractors, installers, users, system designers, and other interested parties to aid in understanding the basic components of lightning protection systems and the applicable codes and standards in order to facilitate a reasonably safe and code-compliant installation.

UL Marking and Application Guides are updated as necessary due to new product development, changes in the codes, or the need for clarification. To confirm the current status of any UL Marking Guide, please consult the Code Authorities page of the UL Web site at www.ul.com/codeauthorities.



Your comments or suggestions are welcome and appreciated. They should be sent to:

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UL Knowledge Services (www.ulknowledgeservices.com) provides workshops to learn the key elements of UL 96A and its practical application. Attendees learn how UL 96A and NFPA 780 relate to each other. Helpful calculation tools for determining a zone of protection are provided.



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INTRODUCTION

USE OF THIS GUIDE

This guide is intended to assist regulatory authorities, designers, and installers to develop, and install a complete lightning protection system that can withstand the tremendous power of a lightning strike. Depending on the type, a strike can exceed 300,000 Amperes, over one giga volt (one billion volts) and with temperatures as high as 36,000 Deg. F., or about three times as hot as the surface of the sun. This guide does not include information on protection of equipment inside a building.

The dissipation of a lightning strike requires correct system design, installation in accordance with UL 96A, NFPA 780 and all listed components correctly installed and connected to earth. And common bonded to the building electrical system in accordance with Article 230, 250, 280, 800 and 810, of the NEC. This installation guide covers definitions and installations used on virtually all types of structures designed and built today. The installation must be designed to protect the entire structure not just a small portion or section of the structure.

It should be understood that this application guide is not a substitute for the correct use of the UL and NFPA Installation Standards that are published and could be adopted by a jurisdiction. Its intent is to simplify and help the user better understand the concept of developing a correct protection scheme for a structure.

UL LISTED AND CLASSIFIED PRODUCTS AND MASTER LABEL CERTIFICATE

System components that are described in this application guide are evaluated in accordance with UL 96, the Product Standard for Lightning Protection Components and are Listed or Classified by UL under an appropriate product category. A four-letter code (shown in parenthesis) following every category title in this guide is the UL product category code designation. A list of lightning protection equipment and related product categories evaluated by UL, along with the applicable standard(s), can be found in Appendix A.

Each UL product category code provides a direct link to the Guide Information for the product category. The Guide Information includes the scope of the products covered, information relating to limitations or special conditions applying to the product, the requirements used for the investigation of the products, installation and use information, and information on product markings and the UL Mark to be used on the product. Guide information is available in the UL White Book and online at www.ul.com/database.

The product markings identified in this guide do not include every possible marking that could be provided either on a product or in its installation or operation instructions. The purpose of these markings is to provide you with an indication of the type of text and location of markings that address features that may be critical in determining if a product is certified and / or if it is installed correctly. Refer to the specific Guide Information for the product category for additional marking information.

The numbering for code sections used in this document may change as the specific code is updated. A list of model codes and standards applicable for each product can be found in Appendix B.

Additional information can be found at www.ul.com.

Lightning Protection System components are intended to be installed and used in accordance with UL 96A, the Standard for Installation Requirements. Following the installation of the lightning protection system it can be site inspected and a UL Master Label Certificate will be issued to compliant systems. The on-site inspection process provides assurance that the Lightning Protection System complies with the appropriate Standards. The system certification has a five-year life span. After five years, the system must be re-certified through a site inspection and a new certificate issued. This five-year reinspection program takes into consideration any possible damage from a lightning strike, possible damage by maintenance personnel walking on components, building structural changes or possible remodeling.

INFORMATION ON LISTING VERSUS CLASSIFICATION

Most codes and regulations require the certification of this equipment to applicable safety-related standards. They also may require this equipment to be certified to energy performance standards as well. Products that are certified to safety-related standards have been evaluated with regard to all reasonably foreseeable safety-related hazards, including fire, electrical shock and mechanical hazards. Such products are termed “UL Certified” or “UL Listed.” Products that are certified to a limited range of hazards, or for use under specific conditions are termed “UL Classified”.

It is important to distinguish the difference between “UL Certified” or “UL Listed” and “UL Classified” and the relation these terms have with the term “listed,” as used in various codes. The term “listed” in the codes generally indicates that the product is required to be evaluated in accordance with the appropriate standard(s) by an independent third party certification organization such as UL. The term “listed” in the codes should not be confused with the term “UL Listed,” as explained above. It is important to recognize that not all certification agencies make this distinction in their certification services.

INFORMATION ON UL MARKS

There are several types of UL Marks that can be found on lightning protection related equipment. General information on each of these Marks is provided below. Each has its own specific meaning and significance. The only way to determine if a product has been certified by UL is to look for the UL Mark on the product itself.

The UL Mark on a product means that UL has tested and evaluated representative samples of that product and determined that they meet the requirements in the applicable standard(s). Under a variety of UL programs, certified products are periodically checked by UL at the manufacturing facility to determine that they continue to comply with the standard(s).

The UL Marks may only be used on, or in connection with products certified by UL, and under the terms of a written agreement between the manufacturer and UL.

UL Listing Mark

This is one of the most common UL Marks. If a product carries this Mark, it means UL found that representative samples of this product met UL’s *safety* requirements. These requirements are primarily based on UL’s own published Standards for Safety, or other recognized third party standards. The UL Listed Mark includes the UL symbol, the word “Listed,” the product or category name, and a control number assigned by UL.



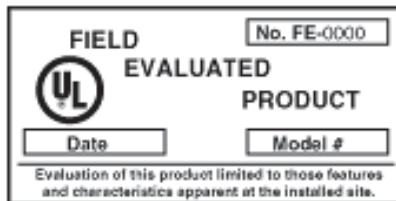
UL Classification Mark

This Mark appears on representative samples of products that UL has evaluated but only with respect to specific properties, a limited range of hazards, or suitability for use under limited or special conditions. The UL Classified Mark includes the UL symbol, the word “Classified,” a statement of the scope of evaluation, the product or category name, and a control number assigned by UL.



FIELD EVALUATIONS

You may encounter situations in which you are unable to determine if a product has been listed by a third-party organization. Or in other situations you might encounter a product bearing a listing label that may have been modified in the field, and now you question whether or not the product still complies with the applicable standard. UL offers a field evaluation service that provides data to assist you in making your decision whether to accept the product and/or approve the installation. Anyone directly involved with a product – including manufacturers, owners, contractors, and regulatory authorities – can request a Field Evaluation. Detailed information for this program can be found on UL’s Web site at www.ul.com/field.



1. DEFINITIONS

AIR TERMINAL – A type of strike termination device intentionally installed for the purpose of intercepting lightning flashes. These items are sometimes referred to as lightning rods.

BONDING – An electrical connection between an electrically conductive object and a component of a lightning protection system with secondary conductor that is intended to significantly reduce potential differences created by lightning currents.

BUILDINGS:

- a) Ordinary Building – A building of common or conventional construction used for ordinary purposes, whether commercial, farm, industrial, institutional, or residential.
- b) Class I Ordinary Building – A building that is not more than 75 feet (22.9 m) high.
- c) Class II Ordinary Building – A building that is more than 75 feet (22.9 m) high or greater.
- d) Metal-Clad Building – A building with either sides or roof made of or covered with sheet metal.
- e) Metal-Framed Building – A building with electrically continuous framing of sufficient size and conductivity to be used as part of the lightning protection system.

CHIMNEY – A smoke or vent stack not meeting the requirements of a heavy-duty stack.

CONDUCTOR – The portion of a lightning protection system intended to transfer lightning discharge currents between strike termination devices and ground or to provide potential equalization between conductive bodies in/on the structure.

- a) Main Conductor – A conductor intended to conduct primary lightning currents that interconnects strike termination devices with grounding electrodes.
- b) Secondary Conductor – A conductor that connects metal bodies within the zone of protection to the lightning protection system to eliminate electrical potential that may create arcing.

EARTH – Finished grade level around a structure.

FASTENER – An attachment to secure a conductor to a structure.

GROUND GRID – A system of grounding electrodes consisting of interconnected bare cables buried in the earth to provide a common ground.

GROUNDING ELECTRODE – That portion of a lightning protection system extending into the earth, such as a ground rod, ground plate, or conductor, serving to bring the lightning protection system into electrical contact with the earth.

GROUNDING – Connected to earth, or to a conductive material that is connected to earth, so that electric charges are distributed freely to the earth.

LIGHTNING PROTECTION SYSTEM – A complete system of strike termination devices, conductors, grounding electrodes, interconnecting conductors, surge protective devices, connectors or fittings.

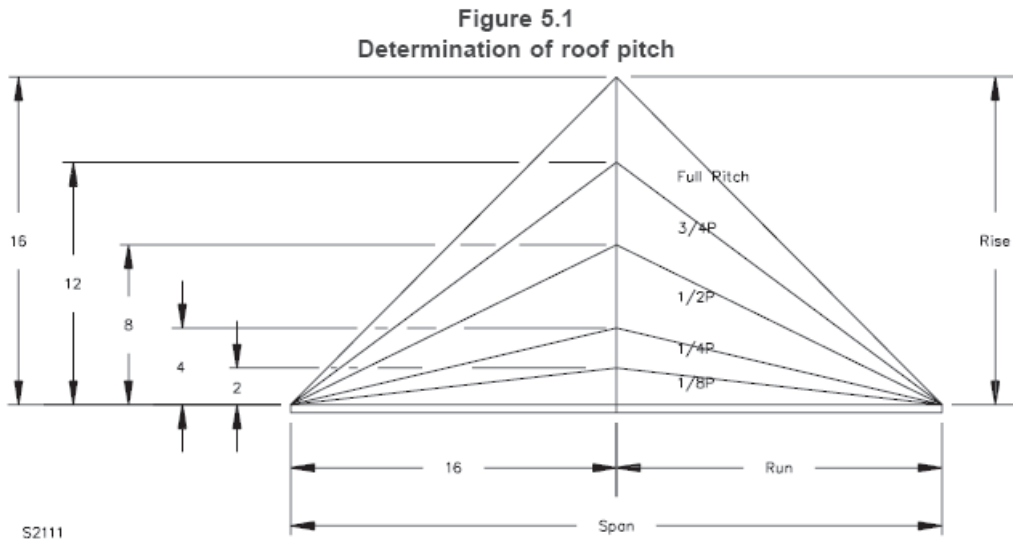
LOOP CONDUCTOR – A conductor:

- a) That encircles a structure; and
- b) That is used to interconnect grounding electrodes, main conductors, or other grounded bodies.

METAL BODY:

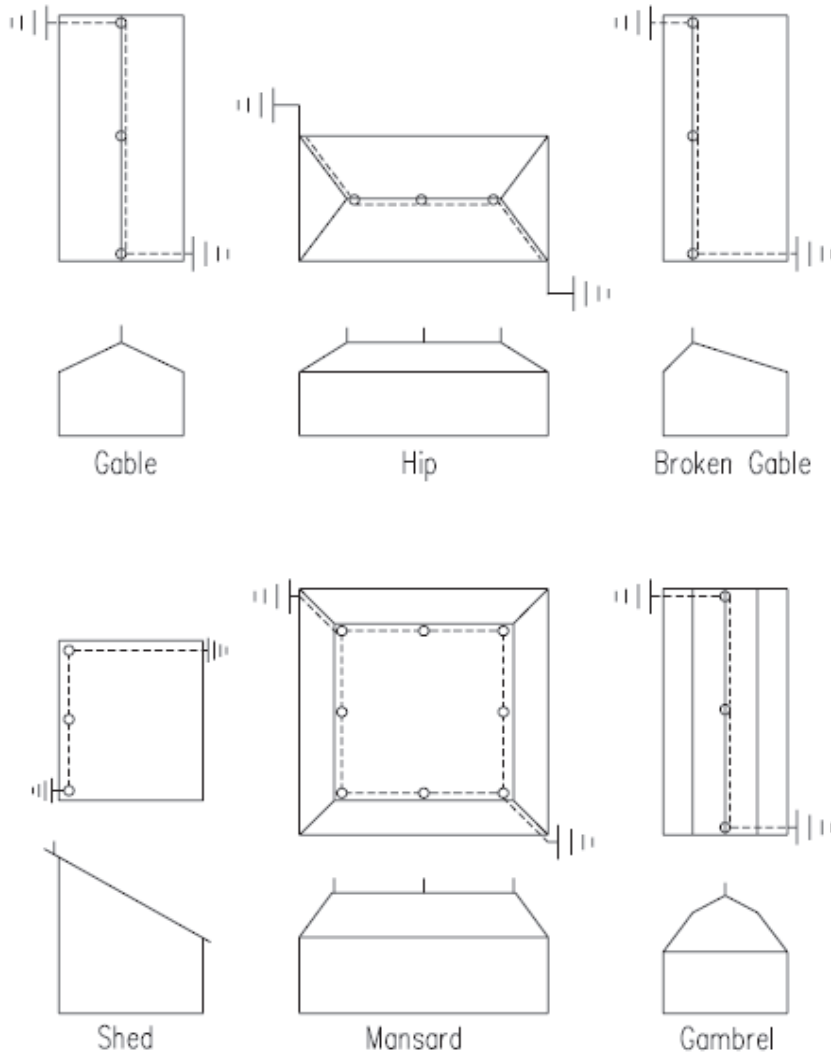
- a) Grounded (Non-Isolated) Metal Body – A metal body having a ground path independent of the lightning protection system.
- b) Isolated (Ungrounded) Metal Body – A metal body having no ground path.

ROOF, FLAT OR GENTLY SLOPING – A roof having a span of 40 feet (12.2 m) or less and a pitch of less than 1/8, or a roof having a span exceeding 40 feet (12.2 m) and a pitch less than 1/4. Roof pitch is determined by the method illustrated in Figure 5.1.

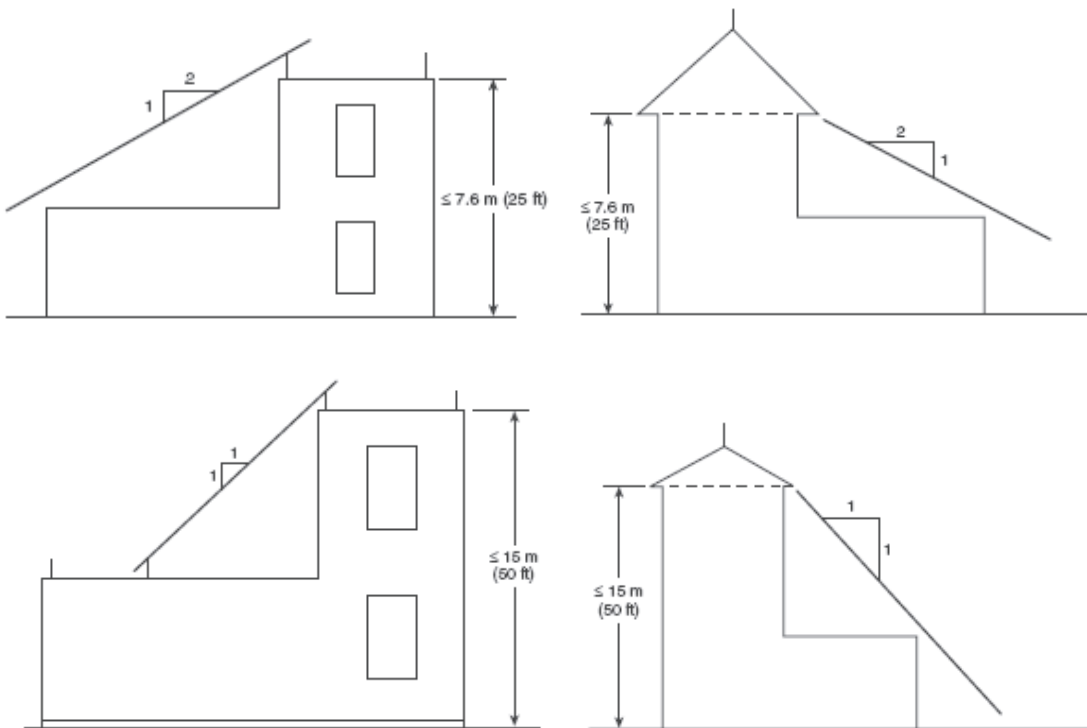


Example: If Rise = 3 units, and Run = 12 units, Pitch = 3/12 = 1/4

Figure 5.2
Roof types
(Top and end views of each roof type are shown)



○ = Air Terminal - - - - = Conductor ⊥ = Ground
S2112B



SECONDARY ROOF AREA – A secondary roof is less than 10 percent of the total roof area of the protected building and lower than adjacent roofs.

STACK, HEAVY-DUTY – A smoke or vent stack more than 75 feet (22.9 m) high, and in which the cross-sectional area of the flue is more than 500 square inches (0.3 m²).

STRIKE TERMINATION DEVICE – A metallic component of a lightning protection system that intercepts lightning flashes and connects them to a path to ground.

STRIKING DISTANCE – The distance over which final breakdown of the initial strike to ground or to a grounded object occurs.

SURGE PROTECTIVE DEVICE (SPD) – A device composed of at least one non-linear component and intended for limiting surge voltages on equipment by diverting or limiting surge current and is capable of repeating these functions as specified.

ZONE OF PROTECTION – The space adjacent to a grounded air terminal or mast or overhead ground wire that is substantially immune to direct strokes of lightning.

2. STRUCTURE PROTECTION

Determining the correct methodology for designing a system of protection is critical to its efficiency and functionality. An average size structure, with a simple roof type, one roof elevation, no uneven vertical changes, and the protection techniques can be rather straightforward and easy to design.

However, if the building structure becomes complex with changes in roof elevations such as a multi-story section, defined shapes such as dormer projections, or tall objects such as stacks, it will require different considerations for design to afford proper protection of the entire structure.

There are three basic methodologies for determining a protection design scheme. Each of the methods listed below is important, and can be used to develop an effective basic design.

The protection schemes shown here are considered Class I; those are buildings less than 75 feet in height.

For Class II structures (those exceeding 75 feet in height or structures such as stacks, steeples etc.) the protection shall include those for Class I but with Class II Air Terminals, cable connectors and splices shall be bolted or welded and rated Class II.

Cable and cable connectors for Class II shall be rated as such and conductor cable shall be rated Class II and be continuous from air terminal to ground and interconnected with the balance of the system.

a. **Air Terminal Placement** using the standard grid placement scheme.

When establishing a zone of protection the air terminal tip is located at not less than 10 inches above the protected object if the interval spacing is not more than 20 feet between air terminals. If a 24-inch air terminal is used, the air terminal spacing may be increased to 25 feet

When the roof exceeds 50 feet in length or width or both directions the spacing can be increased up to 50 feet between terminals on flat or gently sloping roofs. Pending roof design, air terminals may be permitted to be in a pattern not exceeding 50 feet apart in the center part of the roof plan. The perimeter edge spacing can be up to 25 feet between terminals when 24-inch air terminals are used.

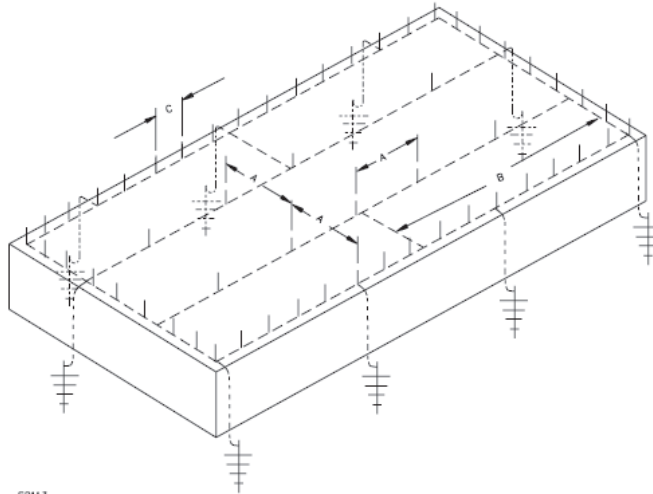
When the roof is pitched with eaves height of 50 feet or less above grade and having no structural projections such as roof dormers or other projections, it requires protection only be mounted to the ridge of the projection roofline.

Air terminals can be mounted on the ridge at spacing not greater than 25 feet. If other projections or are present such as a dormer, irregular roof lines or lower or higher elevations that area may need air terminal placement based on its physical size and shape. Air terminals 10 inches in height and spaced not greater than 20 feet apart are permitted, interval spacing may be increased to 25 feet when 24-inch terminals are installed.

The figures below (fig. 8.1 & 8.2) will illustrate the typical roof protection scheme for most installations with flat roof structures that would be found on warehouse, strip malls and many commercial office structures. Air terminal spacing can be either 20 or

25 feet pending on terminal height. Perimeter and down conductors, with connections to ground rods are also shown.

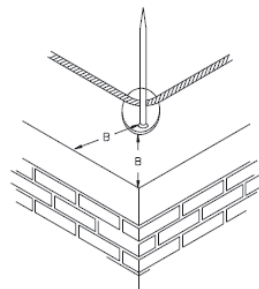
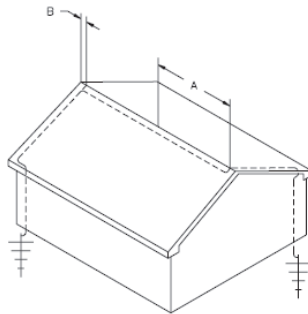
Figure 8.1
Flat or gently sloping roof



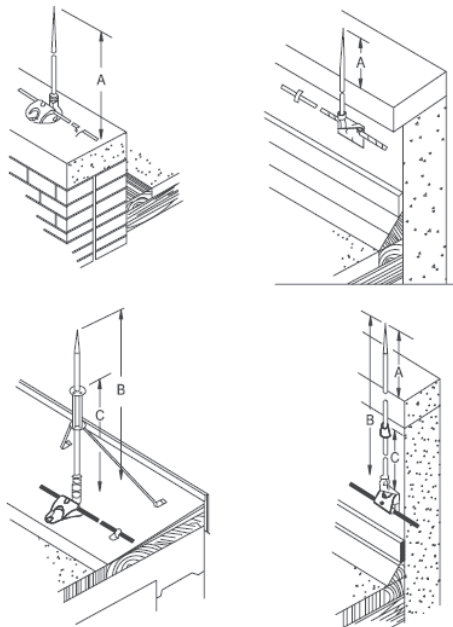
S2113

A= 50 ft.
B= 150 ft.
C= 20 or 25 ft
pending air terminal
Height and not more
than 2 ft from roof
edge.

Figure 8.2
Air terminal locations



S2114

Figure 8.3
Air terminals

S2115B

A - Air terminal minimum height. See 8.2.2.1.

B - Air terminal total height. See 8.1.6.

C - Air terminal support height. See 8.1.6.

A= 10 inches minimum height
 B= 24 inches or more in height
 C= support shall be located at
 not less than one half the height
 of the terminal

b. Rolling Sphere Design.

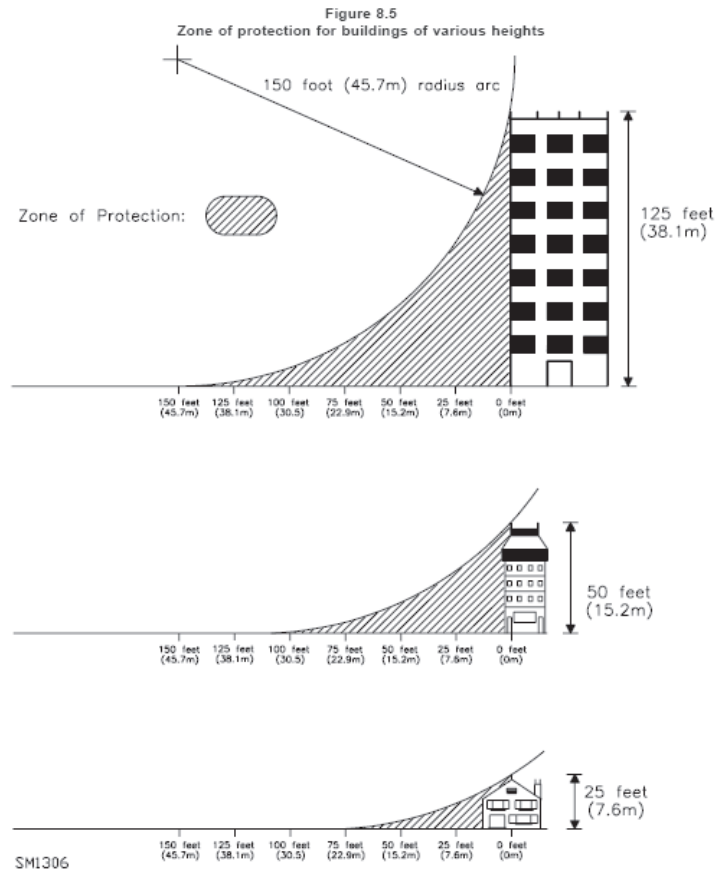
The rolling ball or more correctly the rolling sphere method uses an imaginary spherical shaped ball with a 150-foot radius that rolls over the building structure touching only the tips of the air terminals mounted on the roof. This dimension is based on the fact that the lightning strike distance near the surface of the earth is about 150 ft. or less. The sphere is tangent to earth and will contact three or more correctly spaced air terminals when rolled over any portion of the roof structure.

When using this imaginary sphere and rolling up over and down the other side of the building, it will only touch the roof mounted air terminals, never the building structural roof surfaces. When using the spherical shape to determine the zone of protection for the building structure all possible placements of the sphere on the structure shall be considered for terminal placement.

A protected building that exceeds the height of the lower building structure will protect the lower structure when it lies within the zone of protection of the rolling sphere. Remember that the protective sphere has a 150 ft. radius or is really a 300 foot diameter round ball.

A protected building that is more than a 150 feet high will provide protection for lower elevation roof areas of adjacent, or connected structures, when the lower structure

roof is protected by the arc of the sphere that is tangent to the side of the protected

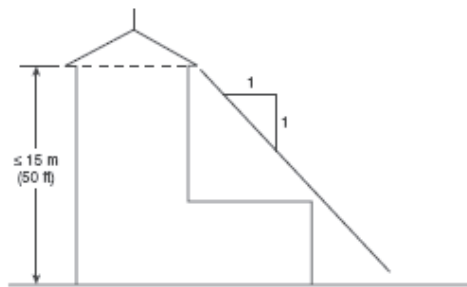
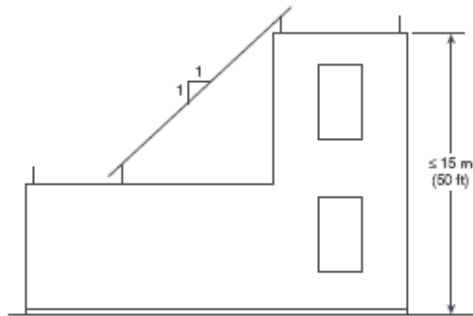
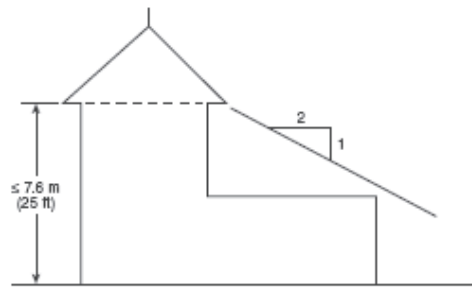
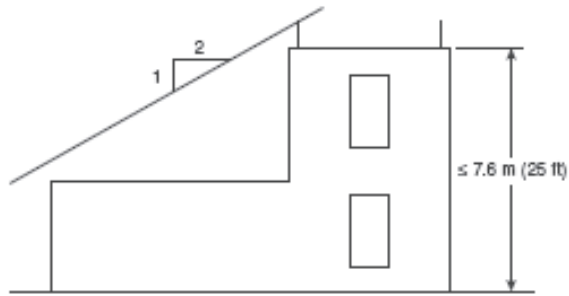


building, and to the earth.

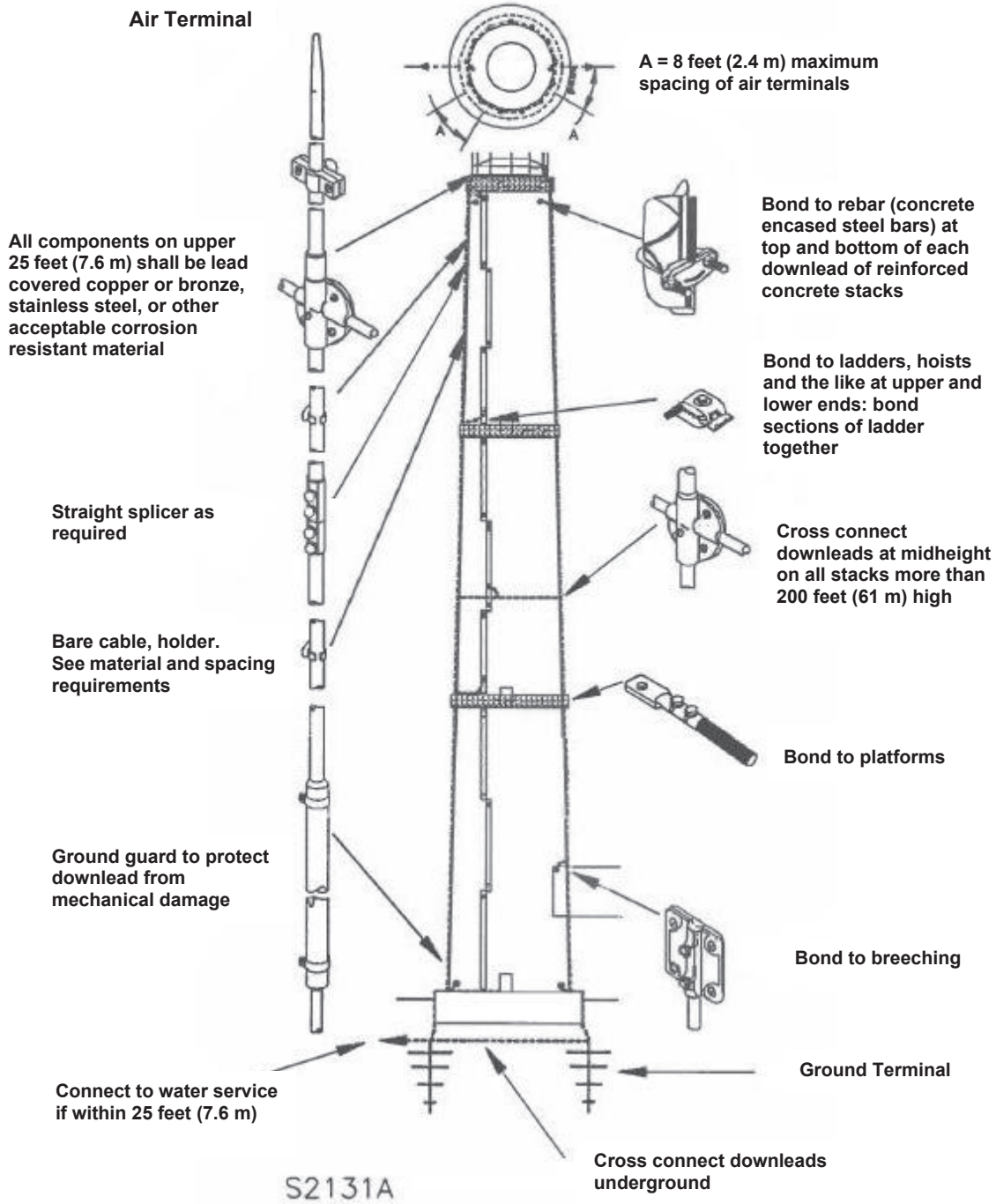
c. Protective angle

The protective angle method is not depicted diagrammatically in UL 96A but is based on a ratio of upper building height and size to lower building area height and size with location and placement of air terminals. These methods do not apply to structures over 50 ft. in height. Methods A, B should be utilized.

If not more than 25 feet to the lower eaves, a 2:1 ratio (2 horizontal feet of building coverage for each vertical foot in elevation) can protect the lower portion of a building or out to the first air terminal location on a large roof structure. If not more than 50 feet to the eaves or to the perimeter air terminal location on a higher flat roof, the lower roof is protected by the higher roof in a 1:1 ratio (1 foot horizontal coverage for each vertical foot from the upper structure). This ratio would also cover the larger flat roof to the first air terminal based on the height ratio. In the diagrams below you can see how this ratio is applied.



Heavy Duty Stacks



3. Heavy-Duty Stacks

Stacks above 75ft in height require some special consideration in both design and material used for the system. All components shall be Class II and class II modified. The components in the upper 25 feet shall be copper, copper alloy, bronze or stainless steel. The top 25 feet can be a high corrosion zone and extra protection of a min of 1/16 in coating of lead is required for terminals, mounting brackets and conductors. Aluminum components are prohibited in this installation.

Class II air terminals on stacks shall be solid copper, copper alloy, stainless steel, titanium or monel metal. The installation shall be evenly distributed around the top of a round stack at intervals not to exceed 8 feet. If the stack is square, the location shall be not more than 2 feet from corners and spaced not more than 8 feet apart.

Each Class II air terminal shall be not less than 18 inches in height and not more than 30 inches in height. The diameter shall be not less than 5/8 inch in diameter. All terminals shall be connected together and there shall be at least 2 down conductors on opposite sides of the stack. Reinforcing steel in concrete stacks shall be electrically continuous and shall be bonded to the lightning protection system at its upper and lower ends at down-lead locations.

4. Components Selection

A protection system and its components are really simplistic when you step back and look at the overall system. What is required is a means to catch a lightning strike at some point on the structure, and then conduct it to an electrode buried in the earth so it can be dissipated.

Along the route to earth, terminals, conductors and grounding electrodes minimize damage to the structure and contents within it. However simple as it may appear, there are some complexities along the way. In accordance with NFPA 780 if an LPS component product is listed, labeled per UL 96 than that product shall be selected and installed. The use of listed products gives greater assurance that when correctly installed in accordance with 96A or NFPA 780 that the entire lightning protection system can be "Site inspected" and receive the UL Master Label Certificate. All components used in an LPS shall be of the following: copper, copper alloy, or electrical grade aluminum unless otherwise specified in the UL 96A Standard. Copper components shall not be installed on or in contact with surfaces of aluminum or external galvanized steel surfaces.

Any aluminum or aluminum alloy product shall not come into direct contact with earth, and any bimetallic fitting shall not be installed within 18 inches above earth level. Aluminum products shall not be embedded in concrete or masonry, in direct contact with a surface coated with alkaline paint, installed in wet locations such as inside of eaves or downspouts.

Air Terminals: shall be not less than 10 inches long, less than 3/8-inch in diameter and may be manufactured in separate parts if longer than 10 inches. The terminal shall be provided with an integral base support, or shall have not less than five full threads of engagement with a separate attachment base mounted to the structure. If the terminal has internal threads the wall thickness shall be not less than 1/16 inch at the base of the threads. Ornaments or decorations are permitted on air terminals, but shall not exceed 20 square inches in any plane. Air Terminals longer than 24 inches shall have bracing at half its height and listed for the purpose

Base Supports: The air terminal bases are permitted to be stamped or cast construction. If stamped, the thickness shall be 0.097 for aluminum and 0.061 for copper material. If cast either copper or aluminum shall be at least 3/32 inches thick. A base support must incorporate a

connector fitting for connection of the lightning conductor. The conductor contact area must be at least 1-1/2 inches on all sides of the cable.

Air Terminal Braces: When air terminals exceed 24 inches in height, they shall be braced or supported at least one-half of the terminal height in accordance with section 8.1.6 of UL 96A. The brace shall be at least ¼ inch rod, constructed from aluminum, copper/copper alloy, stainless steel, or hot dipped galvanized if made of steel and shall be flattened on the end for attachment to the structure with at least a 10-24 bolt or screw.

Conductors: Lightning conductors do not fall into the basic wire size categories, as most field electricians know them.

Class I- main conductors: Stranded copper conductors shall be at least 57,400 circular mils at 187 lbs per 1000 ft. Aluminum conductors shall be at least 98,600 cir.mils at 95 lbs per 1000 ft.

Secondary or bonding conductors the minimum size shall be 26,240 cir. mils for copper and 41,100 cir. mils for aluminum

Class II- main conductors; shall be not less than 115,000 cir. mils for copper conductor at 375 lbs per 1000 ft and, 192,000 cir. mils. for aluminum conductors at 190 lbs per 1000 ft.

Secondary or bonding conductors the minimum size shall be 26,240 cir. mils for copper and 41,100 cir. mils for aluminum.

Grounding Electrodes: Air Terminals, main and secondary conductors plus all other ancillary parts are for the sole purpose of conducting a lightning stroke to earth and dissipating it through the use of various grounding electrode methods.

The grounding electrode shall be a rod of not less than ½ inch in diameter, and 8 feet in length and be of copper-clad steel, solid copper, or stainless steel. The rod shall extend vertically not less than 10 feet into the earth and below the frost line where possible.

Concrete encased shall only be used in new construction. It shall be the same diameter as the main-size conductor. It shall be 20 feet in length and be encased in at least 2 inches of concrete. Or Steel rebar shall also be permitted as a grounding electrode. At least 20 feet of (#4 or ½ in dia.) steel reinforcing bar shall be used. Overlapping at least 20-rod diameters shall be maintained if more than one piece is spliced in the footing, using tie wire or welding.

A main-sized conductor can also be buried from each down conductor in the form of a radial. A radial conductor must be at least 12 feet in length and buried at least 18 in depth.

A ground ring shall be permitted if at least 18 inches under the earth and equal in size to the main-size conductor.

Ground plate(s) shall be permitted if 2 sq. feet or more in size and 0.032 in thick or more and buried not less than 18 inches under the soil.

Where there is shallow topsoil, a combination of the methods above shall be permitted to provide an effective means for dissipating a lightning stroke.

Common Grounding and Bonding: The lightning protection system grounding system shall be bonded and connected to the grounding electrode system for the electrical service, communication system ground, any antennae system grounds, as well as underground metallic piping systems With main size lightning protection cable and connectors see exception in 10.4.2 for the utilization of ground in accordance with Articles 250, 620,800, and 810.

These systems shall include the water service, well casings located within 25 feet of the structure, gas piping, underground conduits, underground liquefied petroleum gas piping etc. The connection to any utility gas line shall be on the customer's side of the meter. The bonding conductor shall be sized the same as the main down conductor and main system conductor.

5. Basic Requirements for System Certification and the UL Master Label Certificate Program

Once the system is completed, Underwriters Laboratories Field Staff can perform an on-site inspection. The system inspection begins with an overall visual inspection for neat and professional installation of the following but not limited to:

- Air terminal layout and placement position with at least 2 directional paths to ground based in structure elevation, roof style, and projections as specified within the Zone of Protection.
- Air terminals tips shall be a minimum of 10 inches in height above the structure spaced not more than 20 feet apart for perimeter protection
- When terminals greater than 24 inches in height are used, they shall be supported at a point at least half the height the rod and be spaced more than 20 but not less than 25 feet apart for perimeter protection
- Any object elevated above the normal roof height and with a surface thinner than 3/16 inch shall be protected, i.e.: exhaust fan housings, camera masts, etc.
- All lightning protection system components shall be listed, excepting hardware screws, bolts etc.
- Main size conductors shall be used for bonding other systems to include but not limited to: metallic water systems, steam or hot water heating systems, electric services, telephone systems, antenna grounds, other large grounded metallic masses and shall not be smaller than 6 AWG.
- The grounding terminal rod shall be at least 8 ft in length and not less than 1/2 in. dia., buried not less than 10 ft plates, concrete encased, rings and trenched systems are permitted as well.
- Copper components are not mounted on aluminum or external galvanized surfaces.
- Cable bend radius at corners or over the building sidewall with 90 deg minimums 8 in radiuses.
- Attachment of cable secured to air terminals, and building shall be secured along the cable run and attachments shall not be more than 3 ft apart.
- Aluminum components shall not be installed in direct contact of copper roof material or below any run off from copper surfaces.
- Aluminum components shall not be in direct contact with earth

- Aluminum down conductors shall be connected to copper conductors using bimetallic fittings within 18 inches of earth.
- Stacks above 75ft in height require Class II components.

6. Summary

When we look at a Lightning Protection System in its most elementary form, it is quite simple. An air terminal(s) to attract and catch a lightning strike, a low resistance conducting cable that connects the air terminal to the earth using a conducting electrode and provide a pathway to dissipate the high energy into the earth. This system provides protection for the structure.

While the overall concept may appear to be simplistic in what it takes to get a lightning strike grounded into the earth, there has been a great amount of science and theoretical investigation developed over the last two plus centuries. Today's modern products, such as air terminals, mounting and support hardware, main and secondary conductors conducting the path to earth along with grounding electrodes have undergone testing and evaluation to achieve product listing and compliance with the Standards for installation. The physical science has been studied and modern theories have evolved to help give a structure better protection by maximizing air terminal placement on roof surfaces.

The UL Lightning Protection Master Label Certificate assures that the system has been installed and inspected to the UL 96A Standard. This certification has a 5-year lifespan and can demonstrate that the building has an extra margin for safety for the structure.

APPENDIX A

UL LIGHTNING PROTECTION CATEGORIES

UL does list this type of equipment to address the safety issues associated with lightning strikes. Below is a list of product categories that UL currently lists to address these types of products, as well as related product categories. Each product category is tabulated with a UL Category Code. You can view the UL Guide Information for the category and any Listings or Classifications under that Product Category in the UL Online Certifications Directory database at www.ul.com/database and enter the category code at the category code search field.

Category Code	Category Name	Standard Used
KDER	Grounding and Bonding Equipment	UL 467
OVGR	Lightning Protection	
OVTZ	Lightning Conductors, Air Terminals and Fittings	UL 96
OWAY	Lightning Protection Systems Installations	UL 96A
	Surge Arresters and Protective Devices	
VZCA	Surge Protective Devices	UL 1449
OWIW	Surge Protective Devices Classified for Use in Specified Equipment	UL 1449
VZQK	Surge Arresters 1000 Volts and Higher	IEEE C62.1 and IEEE C62.11
VZQO	Surge Protectors & Isolators for Use on Cathodically-protected Systems for Use in Hazardous Locations	Hazardous Location standards
XUPD	Surge-protective Device/Panelboard Extension Modules Classified for Use with Specified Equipment	UL 1449 and UL 67
DIMV	Circuit Breakers & Surge-protective Devices	UL 1449 and UL 489
QVGK	Protectors	
QVGQ	Isolated Loop Circuit Protectors	UL 497B
QGVV	Primary Protectors for Communications Circuits	UL 497
QVKC	Primary Protectors for Coaxial Communications Circuits	UL 497C
QVLA	Protectors for Antenna Lead-in Conductors	UL Subject 497E
QVRG	Secondary Protectors for Communications Circuits	UL 497A

APPENDIX B: LIGHTNING PROTECTION CODES AND STANDARDS

Lightning protection equipment must be installed in accordance with model codes and installation standards. These codes require these products to be listed and labeled in accordance with applicable product standards.

UL standards are typically identified as Standards for Safety and cover reasonably foreseeable risks associated with a product. Limitations applicable to the products covered by the standard are delineated in the Scope section of the standard. UL standards are intended to:

- Identify requirements for evaluation of products and provide consistency in the application of these requirements.
- Provide guidance for development of products by manufacturers.
- Provide requirements compatible with nationally recognized installation codes

An UL Outline of Investigation is a document that contains the construction, performance, and marking criteria used by UL to investigate a product when the product is not covered by the scope of an existing UL Standard for Safety. Outlines are not consensus documents and do not require review by an UL Standards Technical Panel (STP) or other external group.

IEEE C62.1	Standard for Gapped Silicon-Carbide Surge Arresters for AC Power Circuits
ANSI/IEEE C62.11	Standard for Metal-Oxide Surge Arresters for AC Power Circuits
NFPA 70 (NEC)	National Electrical Code
NFPA 780	Standard for the Installation of Lightning Protection Systems
UL 67	Panelboards
UL 96	Standard for Installation Requirements for Lightning Protection Systems
UL 96A	Lightning Protection Components
UL 467	Grounding and Bonding Equipment
UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
UL 497	Protectors for Paired-Conductor Communications Circuits
UL 497A	Secondary Protectors for Communications Circuits
UL 497B	Protectors for Data Communications and Fire Alarm Circuits
UL 497C	Protectors for Coaxial Communications Circuits
UL Subject 497E	Outline for Protectors for Antenna Lead-In Conductors
ANSI/UL 1449	Surge Protective Devices



Application Guide

GREEN CONSTRUCTION

JANUARY 2013

PREFACE

Interest in green construction has increased substantially because of environmental and sustainability concerns. All levels of government and building safety professionals recognize the need for a mandatory baseline of codes and standards addressing green construction, providing a framework linking sustainability with safety and performance. To be viable, green construction practices need to address environmental concerns, but they cannot undermine the fundamental levels established for public safety.

UL is committed to the advancement of safe, green construction by conducting the necessary research, developing standards, and testing and certifying products to help society make a smooth and safe transition to green construction methods. UL is an active participant in the development of model construction codes and standards, such as the International Green Construction Code (IgCC), the International Energy Conservation Code (IECC), the National Green Building Standard (ICC 700), Standard for the Design of High-Performance Green Buildings Except Low Rise Residential (ASHRAE 189.1), and the Green Plumbing and Mechanical Code Supplement (GPMCS).

Five UL business units – UL Environment, UL Product Safety, UL Verification Services, UL Life & Health, and UL Knowledge Services – provide services addressing various aspects of green construction.

UL has developed this guide for use by code and inspection authorities, architects, system designers, contractors, installers, users, specifiers, and other interested parties to aid in understanding (1) the basic components of green construction systems, (2) the applicable codes, standards, and product and system certifications needed to facilitate a reasonably safe and code-compliant installation, and (3) UL's services related to green construction.

UL Marking and Application Guides are updated as necessary due to new product development, changes in the codes and standards, or the need for clarification. To confirm the current status of any UL Marking and Application Guide, please consult the Code Authorities page of the UL Web site at www.ul.com/codeauthorities.



Your comments or suggestions are welcome and appreciated. They should be sent to:

Regulatory Services Department
UL LLC
333 Pfingsten Road
Northbrook, IL 60062
ulregulatoryservices@ul.com
www.ul.com/codeauthorities
800-595-9844

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GENERAL INFORMATION

SCOPE OF THIS GUIDE

This Guide is intended to assist regulatory authorities, designers, and installers in finding products and systems evaluated and certified for sustainability. These certifications are intended to help achieve compliance with green construction codes and standards such as IgCC, IECC, ICC 700, ASHRAE 189.1 and GPMCS.

The product markings identified in this Guide are intended to provide general information on the types of certification markings that may appear on products, their packaging or related documentation. Refer to the specific Guide Information published for each product category for additional product marking information.

Additional information can be found at www.ul.com and www.ul.com/environment.

UL SERVICES

Third-party certifications, validations, verifications and testing help code officials and designers in determining compliance with green codes, such as the IgCC and GPMCS, without having to do exhaustive research and verification of data. There are several UL programs and services for various types of products and attributes.

Sustainable Product Certification Service

This service evaluates whether products meet UL or other sustainable product standards (such as BIFMA level or TCNA Green SquaredSM), which measure a product's performance throughout its entire lifecycle, from sourcing to disposal, reuse, and take-backs. These environmental certifications indicate that a product has undergone rigorous scientific testing, exhaustive auditing, or both, to demonstrate its compliance with stringent, third-party environmental performance standards. These standards set metrics for a wide variety of criteria, including energy reduction, waste diversion, recyclability, salvaged material usage, site preservation, transportation reduction, human health impacts and natural resource conservation.

Product Emissions Certifications and Testing

The indoor air quality requirements in the green construction codes include maximum levels of volatile organic compound (VOC) emissions dispersed from specific products and materials. Products that have low chemical emissions, as determined by levels in the GREENGUARD Certification Programs, and bear the GREENGUARD Certification Mark, meet those code requirements.

Environmental Product Declarations (EPDs)

An EPD is a comprehensive, internationally harmonized report that documents the ways in which a product, throughout its lifecycle, affects the environment. EPDs enable manufacturers to disclose all of their products' cradle-to-grave impacts in a credible, streamlined, and universally understood manner. As a program operator, UL Environment also helps develop Product Category Rules (PCRs) for EPDs. The PCR is utilized as a common set of definitions and base information that each EPD for that product category has to disclose and how they should disclose it in the EPD. Typically, an EPD will include information about a product's impact on global warming, ozone depletion, water pollution, ozone creation, and greenhouse gas emissions. An EPD can also include other impacts that are of particular interest to the discloser, such as human toxicity risk.

EPDs act as neither product ratings nor ecolabels; rather, they help architects, designers, specifiers, and other purchasers better understand a product's sustainable qualities. Thus, EPDs are primarily used to make more informed purchasing decisions by providing additional transparency.

Energy Efficiency Certification

As an official EPA-recognized certification body, UL helps manufacturers comply with the latest requirements, conserve resources, reduce energy costs and deliver quality products. By offering premier qualification and verification testing on 30 ENERGY STAR® product categories and as an EPA-recognized CB for 35 product categories, UL is also providing product manufacturers, engineers and designers with various educational resources on the latest enhancements to the ENERGY STAR® program. As an approved certification body by the U.S. Environmental Protection Agency (EPA), UL provides a service to review all new product submissions from manufacturers participating in the ENERGY STAR® program, and to perform qualification testing under specific criteria. Certified products are authorized to bear the ENERGY STAR® label.

Additional Green Certifications

There are additional specific certification services for other sustainable products and systems, such as for cool roofs, used equipment, sound transmission, and renewable energy. Specific references to these certifications are provided later in this Guide.

Environmental Claim Validation

This service validates, through independent evaluation, one or more environmental claims made by manufacturers for specific products. UL validated products may bear the Environmental Claim Validated logo on their marketing materials and packaging. Also, validation can be provided for environmental claims that are new to the market or do not have an existing testing protocol. The typical process for nonstandard claims includes a preliminary assessment of the proposed environmental claim, an evaluation of the claim, and development of a protocol to test the product and validate the claim. Product attributes that are validated include recycled content, rapidly renewable materials, use of regional materials, VOC content, energy efficiency, water efficiency, hazardous or toxic substances, "absence of" claims, reclamation programs, mold resistance, degradability, and compostability.

The EcoLogo Program identifies environmentally preferable products in more than 80 product categories. Founded in 1988, the EcoLogo Program awards its mark to products that demonstrate environmental leadership within their category. EcoLogo is an ISO 14024 Type 1 program. An audit process verifies that each product complies with the criteria established in EcoLogo standards. More than 11,000 EcoLogo-certified products are currently available on the market.



VALUE OF THIRD-PARTY CERTIFICATION

Environmental and public health claims should always be certified by an independent, third-party organization. This contributes rigor, stringency and credibility, protects manufacturers' and specifiers' reputation and reduces liability.

One helpful step in evaluating an eco-label is to consider the organization that stands behind it. Using these criteria, certifications will fall into one of the three basic categories as outlined below:

- First-party certification equates to a self-declaration. This type of certification is not based on verification by independent third parties. The rigor and credibility of such claims, therefore, is less certain than claims that have been independently certified.
- Second-party certification is performed by an industry, trade or special interest group that purchases or otherwise has a user interest in the products being certified, and has critical involvement in the certification, either through administration of the certification program, verification of the claims or creation of the standards and methods. Second-party certifications are very common and often confused as being third party.
- Third-party certification refers to certification programs in which declaration of conformance to requirements is made by a body that is independent of the body that provides that product and of user interests in that product.

Look for products that have undergone testing and analysis that is scientifically based and can be easily replicated. For more information on evaluating green product claims, see <http://sinsofgreenwashing.org/findings/the-seven-sins/>

UL CERTIFICATION MARKS AND DATABASES

UL has several third-party certification marks to identify those products that have been evaluated as meeting environmental test protocols and standards as required by various green codes. UL certification databases provide a means for code officials and designers to readily find products that are third party certified by UL. These marks and databases are detailed below.

UL Sustainable Product Certification Mark



The UL Sustainable Product Certification Mark indicates that a product has been tested/audited by UL and found to comply with the terms of the standard used for evaluation. Examples of the types of products that will carry the Sustainable Product Certification Mark include carpeting, office furniture, information technology equipment, building products and consumer electronics. More products will be added as sustainable product standards become available.

UL Environmental Claim Validation



A UL Environmental Claims Validation (ECV) logo on a product's packaging indicates that the product meets UL Environment's claim-specific validation requirements.

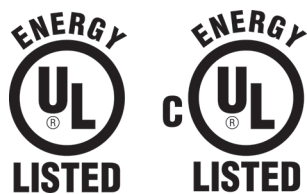
Claims validated include: recycled content, recyclability, degradability, compostability, rapidly renewable materials, regional materials, volatile organic compounds (VOCs) content, energy efficiency, energy audits, water efficiency, hazardous or toxic substances, reclamation and mold resistance.

Once the product claims have been validated, details are posted on UL Environment's **Database of Validated and Certified Products**, an online tool that allows users to identify sustainable products by product category, company name, product name or type of claim. Manufacturers may use the Environmental Claims Validated logo on marketing materials and packaging.

Information on validated and certified products is located in UL Environment's **Database of Validated and Certified Products**. To be included in this database, a product must have been validated through Environmental Claims Validation or certified through Sustainable Product Certification. This online tool allows users to quickly sort and identify products by product category, company name, product name or type of claim.

<http://www.ul.com/global/eng/pages/offerings/businesses/environment/databasesearch/>

UL Energy Verification and Efficiency Marks



The UL Energy Mark appears on air conditioners, furnaces, refrigerators, freezers, dishwashers, washers, dryers, water heaters, cooking equipment, high tech equipment, lighting products and similar products evaluated to specific U.S. and Canadian energy efficiency standards. These products are already certified for safety by UL before earning the UL Energy Mark. These energy verified products can be found in the UL Online Certification Directory at www.ul.com/database.



This Mark appears on products and the packaging of products that meet energy efficiency requirements in regulations such as ENERGY STAR[®], Natural Resources Canada (NRCAN) and California Energy Commission (CEC). The mark incorporates a leaf encapsulating the familiar “UL” initials and includes the words “Energy Verified” in black text.

The results of products earning the EEC Mark appear in UL Environment’s Database of Validated and Certified Products.

<http://www.ul.com/global/eng/pages/offerings/businesses/environment/databasesearch/>

GREENGUARD Indoor Air Quality Certification



This Certification Mark appears on products designed for use in office environments and other indoor spaces that have been tested/audited and found to meet strict chemical emissions limits.

GREENGUARD Children & Schools Certification



This Certification Mark shows compliance to all of the green code low-emitting product requirements for products intended for use in schools, daycares or other environments where children spend significant periods of time. More stringent than the indoor air quality certification, this certification was originally intended for products used around sensitive populations, and has now evolved into a primary certification program that is also applicable for building products, furniture, and children’s focused products.

GREENGUARD SELECT CERTIFICATION



This Certification Mark is used to identify products for use in specific environments (e.g. commercial, educational, healthcare, and home) that meet strict chemical emissions limits.

For more information, or to view a complete list of certified products, visit www.greenguard.org.

Listed and Classified Products

Products are Listed or Classified (Certified) by UL under a variety of product categories that are identified by a four-letter UL category code. The category code is shown in parenthesis following every product category title in this guide.

- Information on products and systems Certified by UL for applications regulated by the IgCC and IECC, along with the applicable standard(s), can be found in Appendix A.
- Information on products and systems Certified by UL for applications regulated by ICC 700, along with the applicable standard(s), can be found in Appendix B.
- Information on products and systems Certified by UL for applications regulated by the GPMCS, along with the applicable standard(s), can be found in Appendix C.

Each UL Product Category code in these Appendices provides a direct link to the Guide Information for the product category. The Guide Information typically includes (1) a description of the products covered, (2) the associated installation code, (3) a description of limitations or special conditions associated with the product, (4) the requirements or standards used to investigate the products, and (5) a description of the UL Mark used on certified products. Guide Information is also available in the UL Online Certifications Directory at www.ul.com/database.

UL Listing Mark



The UL Listing Mark is one of the most common UL Certification Marks. If a product carries this Mark, it means UL found that representative product samples met UL's safety requirements. These requirements are primarily based on UL's own published Standards for Safety. This type of Mark is seen commonly on appliances and computer equipment, furnaces and heaters, fuses, electrical panel boards, smoke and carbon monoxide alarms, fire extinguishers and sprinkler systems, personal flotation devices, bullet resistant glass, and thousands of other products.

There are three variations of UL's Listing Mark: one used only in the United States, one used only in Canada, and one for both the United States and Canada. The C-UL Mark is applied to products for the Canadian market. The products with this type of Mark have been evaluated to Canadian safety requirements, which may be somewhat different from U.S. safety requirements. The optional C-UL-US Mark indicates compliance with both Canadian and U.S. requirements.

The UL Listing Mark appears on end products and complete components suitable for factory and field installation. All of the products carrying a UL Listing Mark are covered by UL's Follow-Up Services program to verify that end products and components carrying the UL Listing Mark continue to be manufactured in compliance with UL's safety requirements. A UL Listing Marking typically consists of four required elements:

- The UL symbol
- "Listed"
- The product name
- An alphanumeric control or issue number

Additional elements and markings may be present for products that carry UL's EU Mark.

UL Classification Mark



This Mark appears on products that UL has evaluated with respect to specific properties, a limited range of hazards, or suitability for use under limited or special conditions. Typically, products Classified by UL fall into the general categories of building materials and industrial equipment. Examples of types of equipment Classified by UL include immersion suits, fire doors, protective gear for fire fighters and industrial trucks.

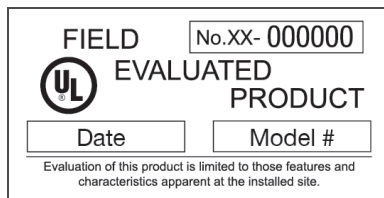
Just like the UL Listing Mark, there are also three variations of UL's Classification Mark: one used only in the United States, one used only in Canada, and one for both the United States and Canada. The C-UL Classification Mark is applied to products for the Canadian market. The products with this type of Mark have been evaluated to Canadian standards for a specific hazard or property. The optional C-UL-US Classification Mark indicates compliance with both Canadian and U.S. requirements.

All of the products carrying a UL Classification Mark are covered by UL's Follow-Up Services program to verify that products carrying the Mark continue to be manufactured in compliance with UL's safety requirements. A UL Classification Marking typically consists of four required elements:

- The UL symbol
- "Classified" and a qualifying statement as to the specific hazard or property
- The product name
- An alphanumeric control or issue number

Field Evaluations

You may encounter situations in which you are unable to determine if (1) a product has been listed by a third-party organization, (2) a product bearing a Certification Mark that was modified or rebuilt in the field still complies with the applicable standard, or (3) a used or rebuilt product is suitable for use in a new application. UL offers a field evaluation service that provides data to assist you in making your decision whether to accept the product and/or approve the installation. Anyone directly involved with a product – including manufacturers, owners, contractors and regulatory authorities – can request a Field Evaluation. Detailed information for this program can be found on UL's Web site at www.ul.com/field.



CODES AND STANDARDS

UL participates in the development and maintenance of model codes and sustainability standards published by other standards development organizations and model code organizations, and develops additional standards as needed. A list of model codes and standards applicable for sustainable construction can be found in Appendix D. The numbering for code sections used in this document may change as the specific code is updated.

International Green Construction Code (IgCC)

The IgCC, published by the International Code Council (ICC) is a comprehensive model code establishing minimum regulations for buildings and systems using prescriptive and performance-related provisions, working as an overlay to the other I-Codes. For example, the requirements of the 2012 *International Energy Conservation Code* were targeted as a baseline for the *International Green Construction Code* energy provisions that can be increased through the selection of “Jurisdictional Requirements” and “Project Electives.” It is founded on the principle that a model code must address the market segments beyond those captured by rating systems or other evaluation guides, and therefore, must be enforceable, useable and adoptable.

National Green Building Standard (ICC 700)

ICC 700 is an ANSI residential green building rating system, published by the ICC. The standard defines green building for single- and multifamily homes, residential remodeling projects, and site development projects while still allowing for the flexibility required for regionally-appropriate best green practices.

International Energy Conservation Code (IECC)

The IECC is a model code published by ICC that regulates minimum energy conservation requirements for new buildings. The IECC addresses energy conservation requirements for all aspects of energy uses in both commercial and residential construction, including heating and ventilating, lighting, water heating, and power usage for appliances and building systems.

Standard for the Design of High-Performance Green Buildings Except Low Rise Residential, (ASHRAE 189.1)

ASHRAE has published Standard 189.1. The standard focuses on building sustainability designs and operational issues of green buildings. From site location to energy use to recycling, this standard sets the foundation for green buildings by addressing site sustainability, water use efficiency, energy efficiency, indoor environmental quality, and a building’s impact on the atmosphere, materials and resources. Standard 189.1 serves as a compliance option in the 2012 IgCC.

Green Plumbing and Mechanical Code Supplement (GPMCS)

The International Association of Plumbing and Mechanical Officials (IAPMO) publishes the GPMCS. The supplement is a separate document from the Uniform Plumbing and Mechanical Codes and establishes requirements for green building and water efficiency applicable to plumbing and mechanical systems. The GPMCS serves as an adjunct to the Uniform Codes or any of the plumbing and mechanical codes used in the United States.

Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems (NFPA 3)

NFPA 3, published by the National Fire Protection Association (NFPA), provides building commissioning requirements and direction to confirm that active and passive fire protection and life safety systems function as they were intended.

UL Standards for Sustainability

UL Sustainability Standards are used to establish the basis for identifying environmentally preferable products, based on environmental sustainability criteria associated with a product's manufacture, distribution, use, and eventual disposal. The requirements in UL Standards are developed based on the life cycle stages of the associated products. Additional UL Standards have been developed based on the criteria used for the EcoLogo Program.

All of UL's Sustainability Standards can be found at

http://www.ul.com/global/eng/pages/offerings/businesses/environment/resources/standard_s/index.jsp and are free to download. UL is seeking stakeholders to participate in the development of sustainability standards. Interested stakeholders should contact UL at **Standards@ULEnvironment.com**.

GREENGUARD Standards and Testing Methods

UL establishes standards and testing methods for the GREENGUARD certification programs to reduce human exposure to chemicals and to improve indoor air quality. These standards are based on available standards and guidelines from national and international public health agencies. All GREENGUARD standards are publicly available, along with test protocols, and all public comments are considered. These standards include GREENGUARD IAQ Standard for Building Materials, Finishes and Furnishings, and GREENGUARD Children & Schools Standard. The certifications established using these standards, such as GREENGUARD Children & Schools and GREENGUARD Select, qualify for numerous low-emitting criteria or credits in major sustainable codes, rating systems and standards, and can be found at **www.greenguard.org**.

Environmental test chambers and indoor exposure models are used to characterize emissions performance of products and their components. Achievement of test results requires rigorous sample selection procedures, defined sample collection and handling procedures, and implementation of precise and accurate analytical measurement systems and procedures. Additionally, a product manufacturer must have a production quality control system in place that is capable of assuring that products are manufactured consistently with similar emissions characteristics over time. Emission criteria are established for total VOC (TVOC), formaldehyde, total aldehydes, all individual chemicals with currently published Threshold Limit Values (TLVs), respirable particles, and certain odorants and irritants. In addition, all products are screened and reported for carcinogens and reproductive toxins as listed by key government and regulatory programs. Emission criteria may vary, based on the product formulation and its use.

ENERGY STAR®

Products can earn the ENERGY STAR® label by meeting the energy efficiency requirements set forth in ENERGY STAR® product specifications. EPA establishes these specifications based on the following set of key guiding principles:

- Product categories must contribute significant energy savings nationwide.
- Qualified products must deliver the features and performance demanded by consumers, in addition to increased energy efficiency.
- If the qualified product costs more than a conventional, less-efficient counterpart, purchasers will recover their investment in increased energy efficiency through utility bill savings within a reasonable period of time.
- Energy efficiency can be achieved through broadly available, nonproprietary technologies offered by more than one manufacturer.
- Product energy consumption and performance can be measured and verified with testing.

Labeling effectively differentiates products and is to be visible for purchasers. ENERGY STAR® product specifications can be found at http://www.energystar.gov/index.cfm?c=product_specs.pt_product_specs.

BUILDING DEVELOPMENT

Green codes include requirements for the development and maintenance of buildings to minimize negative environmental impacts. The heat island effect of a building can be mitigated by installing cool roofs.

COOL ROOFS (SOLAR REFLECTANCE AND THERMAL EMITTANCE)

Roofing materials with solar reflectance and thermal emittance properties are sometimes referred to as “cool roofs.” A cool roof works by both absorbing the sun’s heat and reflecting (or radiating) it back to the sky instead of transferring it into the building structure. The effectiveness of a cool roof is measured by solar reflectance and thermal emittance. Both properties are measured individually from 0 to 1.0, with 1.0 being the material with the best performance.

Solar reflectance measurements, which evaluate temperatures and heat flows across surfaces exposed to solar radiation, are typically determined in accordance with ASTM C1549. Thermal emittance measurements, which evaluate temperatures, heat flows, and derived thermal resistances of materials, are typically determined in accordance with ASTM C1371.

UL certifies solar reflectance roof covering materials based on them meeting or exceeding the minimum initial solar reflectance measurements as specified in Product Specification Eligibility Criteria of the ENERGY STAR® Program Requirements for Roof Products, which includes a three-year weather exposure test. Materials evaluated for low-slope installations are intended for use on roof surfaces with an incline of 2-inch or less rise per horizontal foot. Materials evaluated for steep-slope installations are intended for use on roofs with an incline of greater than 2-inch rise per horizontal foot.

For Classification (certification) of field applied roof coatings, the products are investigated on a smooth light-gauge metal substrate at the intended application thickness. For information on varying thicknesses of coating and alternate substrates, refer to the detailed installation instructions accompanying the UL Certified product.

Roofing materials complying with these requirements are Classified under the Solar Reflectance, Roof Covering Materials product category (TGFE). Individual certifications include the manufacturer's name and material designation, along with the initial and maintained (three-year) solar reflectance and thermal emittance values. When "NA" is indicated in an individual Classification, the three-year weather exposure data is not available but is awaiting completion of the exposure period. Information concerning the specific initial solar reflectance values is provided in the detailed installation instructions accompanying the UL certified product.

The information included with these UL certifications makes it easy to determine compliance with code requirements. In addition, the UL Classification Mark appears on certified materials or their packaging, along with information on whether the material is suitable for a low-slope or steep-slope application as well as the initial and maintained (three-year) solar reflectance and thermal emittance values.

MATERIAL RESOURCE CONSERVATION AND EFFICIENCY

Green codes contain requirements addressing the re-use of equipment, material properties including recycled content, and limitations on the amount of mercury in fluorescent lamps.

USED EQUIPMENT

One aspect of green construction practices involves recycling used equipment, including various degrees of rebuilding, remanufacturing, refurbishing, repairing or reconditioning of equipment. The result is commonly referred to as a "rebuilt" product.

Rebuilding Equipment Raises Safety Concerns

The UL Listing Mark on a newly manufactured piece of equipment is an indication that the product complies with nationally recognized safety requirements when the product was shipped from the factory, and that it is suitable for installation and use in accordance with specific model codes. However, if a product is rebuilt, UL cannot confirm that it continues to comply with appropriate safety requirements without an additional investigation.

A Field Evaluation is an effective way to determine if a rebuilt product continues to comply with UL safety requirements. However, a separate evaluation is needed to determine the acceptability of each rebuilt equipment installation.

To address situations where a company rebuilds equipment on a regular basis, UL has developed programs to determine the suitability of equipment rebuilt under a more structured equipment rebuilding program.

Rebuilt Equipment Certification Programs

UL's rebuilt equipment certification programs primarily address safety concerns, but also address green construction practices, since the rebuilt equipment can be reused, instead of disposed in a landfill. These programs cover specific types of products that can be fully evaluated to the same safety requirements used to evaluate newly constructed products. For a rebuilt product to be considered for certification, UL first needs to establish the feasibility of determining compliance of the product with all the applicable product safety requirements. Concerns that need to be addressed include the potential effects of deterioration due to normal use and aging or damage caused by fire, flood, seismic, wind or electrical faults.

UL has established rebuilt equipment certification programs when either an original manufacturer or another party has the necessary facilities, technical knowledge and manufacturing skills to rebuild products that continue to comply with UL safety requirements. These programs require the equipment rebuilder to comply with the following requirements:

- The original UL Mark must be removed from the equipment being rebuilt, or permanently defaced.
- The equipment can only be modified using materials and procedures that are suitable for the application.
- Production line testing may be conducted to verify that the rebuilt equipment complies with specified performance requirements.
- Rebuilt equipment complying with all program requirements is plainly and permanently marked with the name of the rebuilder and a UL Mark containing the term "Rebuilt" or other terminology suitable for the product category.
- The rebuilt equipment is to be subjected to the same requirements as newly constructed equipment.

There are types of products for which UL has chosen not to establish equipment rebuilding programs due to safety considerations that cannot be adequately addressed. For example, UL does not have a certification program for rebuilding or refurbishing molded case circuit breakers.

Over the years, UL has created certification programs for rebuilt cooking appliances, refrigerators, vending machines, uninterruptible power supplies, motor controllers, motors for use in hazardous locations, office furnishings and electric signs, to name a few. The Guide Information for each product category with a rebuilt certification program references the existence of such a program and identifies the applicable UL Mark for rebuilt products.

UL certified rebuilt products are marked "Rebuilt," "Remanufactured," or "Reconditioned." Product categories that include provisions for rebuilt equipment can be located in UL's Online Certification Directory by performing a keyword search for "rebuilt."

RECYCLED CONTENT

There is significant discussion within the environmental and manufacturing communities about which materials can be claimed as pre-consumer recycled content. UL Environment has developed a white paper to provide clarity on interpreting existing guidelines to validate claims of pre-consumer recycled content and to serve as a reference for manufacturers. See:

http://lms.ulknowledgeservices.com/common/lmsform.aspx?Form=WhitePaperAccount&Doc=UL_E_RCC_070810.pdf

Definitions of Key Recycled Content Terms

Many sustainable product consensus standards base their recycled content definitions on ISO 14021:2001. However, each standard has variations on key terms, and these differences create confusion in applying requirements to the waste products. In some instances, broad interpretation of existing terms may exclude any waste from being called “recycled content,” or may result in inconsistent applications of the definitions.

UL Environment has developed definitions for the most relevant terms associated with pre-consumer recycled content, as noted below. These key terms are based on publicly available definitions from various sources as well as UL Environment’s experience and insight.

By-Product (Co-Product) — A production material that is not waste and possesses characteristics that make it ready for further use in the marketplace without any further processing.

Post-Consumer Material — Material that has reached its intended end user which is no longer being used for its intended purpose.

Pre-Consumer (Post-Industrial) Material — Material diverted from the waste stream during a manufacturing process that has never reached the end user. Excluded is the reutilization of materials generated in a process and capable of being reused as a substitute for a raw material without being modified in any way.

Manufacturing Process — Sequence of interdependent and linked procedures or actions designed to convert inputs (material, parts, etc.) into outputs (waste, by-product, etc.) until an intermediate or final product is produced.

Unit Process — A single procedure or action designed to convert inputs (material, parts, etc.) into outputs (waste, by-product, etc.) resulting in an intermediate or final product.

Recovered (Reclaimed) Material — Material that would have otherwise been disposed of as waste or used for energy recovery, but has instead been collected and recovered (reclaimed) as a material input, in lieu of new virgin material, for a recycling or manufacturing process.

Recycled Content — The proportion of pre-consumer or post-consumer recycled material, by mass, in a product or packaging.

Recycled Material — Material that has been reprocessed from recovered (reclaimed) material by means of a manufacturing process and made into a final product or into a component for incorporation into a product.

Waste — Material from a generator or holder that does not possess characteristics or meet technical specifications for use in the marketplace without further processing, and that the generator/holder intends or is required to discard or release to the environment.

Waste Stream — The total flow of solid waste from homes, businesses, institutions and manufacturing plants that is recycled, burned or disposed of in landfills or segments thereof.

MERCURY CONTENT IN COMPACT FLUORESCENT LAMPS (CFLS)

IgCC Section 506.3 requires single-ended pin-base and screw-base CFLs to contain no more than 5 milligrams of mercury per lamp, except lamps rated at 25 watts or greater are required to contain no more than 6 milligrams of mercury per lamp. CFLs are required to be listed and labeled in accordance with UL 1993.

Compact Florescent Lamps are listed under the Self-ballasted Lamps and Lamp Adapters product category (OOLR) in accordance with UL 1993. This category covers self-ballasted lamps consisting of a ballast, transformer or power supply, and an integrated or replaceable lamp, for direct connection to a lampholder. UL 1993 requires the CFLs that contain mercury to be marked in accordance with federal law. The smallest unit packaging, point-of-sale package, carton or “stuffer sheet” packed with each lamp additionally identifies lamps that contain mercury and provide information for their safe cleanup, disposal and recycling.

ENERGY CONSERVATION, EFFICIENCY AND CO₂E EMISSION REDUCTION

Green codes contain requirements addressing energy metering and monitoring, building energy management and control systems, use of electric vehicles, energy efficient appliances and equipment, and renewable energy systems.

ENERGY METERING AND MONITORING

Green codes require a means to be provided to measure, monitor, and report on the energy use, production and reclamation in a building. This includes the design of energy distribution systems so as to isolate load types, the installation of or ability to install in the future meters, devices and a data acquisition system, and the installation of or the ability to provide for public displays and other appropriate reporting mechanisms in the future.

UL lists this equipment under the Energy Usage Monitoring Systems product category (FTRZ). This category covers products intended for use in metering of utility and nonutility electric power. The primary function of these devices is to monitor power consumption on a building main supply or separate branch circuits. These devices may communicate with other devices by means of power line carrier, satellite/radio frequency, telephone, cable or other means. UL provides a service for the Classification of watt-hour meters for use in metering of utilities that not only meet the appropriate requirements of UL but also have been investigated in accordance with standards or parts detailed below from the American National Standards Institute (ANSI):

- ANSI/NEMA C12.1, Code for Electricity Metering
- ANSI/NEMA C12.10, Physical Aspects of Watthour Meters
- ANSI/ NEMA C12.11, Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL (0.6 kV NSV through 69 kV NSV)
- ANSI/NEMA C12.20, Electricity Meters – 0.2 and 0.5 Accuracy Classes

ENERGY MANAGEMENT EQUIPMENT

Green codes require a building energy management and control system (EMCS) to be provided and integrated with building HVAC systems controls and lighting systems controls to receive an open and interoperable automated demand response (Auto-DR) relay or internet signal. Building HVAC and lighting systems and specific building energy-using components are required to incorporate preprogrammed demand response strategies that are automated with a demand response automation internet software client.

UL lists equipment that energizes or de-energizes electrical loads to achieve the desired use of electrical power under the Energy Management Equipment product category (PAZX) in accordance with UL 916. This equipment normally controls electrical loads by responding to sensors or transducers monitoring power consumption, sequencing, cycling the loads through the use of preprogrammed data logic circuits, or any combination thereof. Devices responding to signals from a utility company may receive the signals over the power lines or as radio signals. Typical loads controlled by this equipment include space heating, air conditioning and lighting.

ELECTRIC VEHICLE CHARGING EQUIPMENT

The IgCC requires parking spaces dedicated for electric vehicles to be provided for the occupants of green buildings. UL lists electric vehicle charging equipment under the product category Electric Vehicle Charging System Equipment (FFTG), in accordance with UL 2202, or electric vehicle supply equipment under the product category Electric Vehicle Supply Equipment (FFWA), in accordance with UL 2594. The FFTG category covers conductive charging system equipment, with a DC output, intended for use with electric vehicles. The equipment can be either off board or on board type equipment. Off-board equipment is intended for indoor or outdoor use; on board equipment is always considered outdoor use. This equipment is rated 600 V or less at the input. The FFWA category covers conductive supply equipment, with an AC output, that is intended to supply power to a vehicle's on board charger. This equipment is always off board and can be intended for indoor or outdoor use. In both categories, the off board equipment is intended to be connected to the vehicle by means of a flexible cable and an electric vehicle connector, and intended for installation in accordance with NFPA 70.

ENERGY EFFICIENCY

The IECC and IgCC address the need for the effective use of energy through the use of energy efficient equipment. The IgCC requires certain products to comply with ENERGY STAR[®] requirements.

The ENERGY STAR[®] program is a voluntary labeling program jointly administered by the U.S. Environmental Protection Agency (EPA) and the Department of Energy (DOE). It was launched in 1992 to help consumers identify products that are more energy efficient.

Effective Jan. 1, 2011, the U.S. Environmental Protection Agency (EPA) requires that all new product submissions from manufacturers participating in the ENERGY STAR[®] program be reviewed by an EPA-recognized Certification Body (CB), and that qualification testing be performed under specific criteria. Product qualification requires testing to be performed at EPA-recognized facilities.

UL was one of the first organizations to earn recognition by the EPA as an approved certification body. Recognized certification bodies are required to comply with ISO/IEC 17025 for testing, calibrations and sampling, if they perform those functions, as well as be accredited to ISO/IEC Guide 65 for bodies operating product certification systems.

UL also verifies various products, such as room air conditioners, packaged liquid chillers, refrigerated beverage vending machines, clothes dryers, dehumidifiers, exit signs, ceiling fans, fluorescent lamp ballasts, gas-fired furnaces, refrigerators, dishwashers, and clothes washers for energy efficiency in accordance with specific regulations or standards in the United States and Canada. These regulations and standards include specific test procedures established by AHAM, AHRI, ASHRAE, CSA, and U.S. Department of Energy (DOE). Certified products bear the UL Energy Mark and identify the regulation or standard used to verify compliance. A list of product categories for these verifications is in Appendix A.

Nonregulated electric motors are verified for energy efficiency in accordance with CSA, IEC and IEEE standards under the product category for Electric Motors Verified for Energy Efficiency (ENVR). Electric signs are verified for energy efficiency in accordance with the California Code of Regulations, Title 24, Part 6, Section 148 under the product category for Electric Signs Verified for Energy Efficiency (ENVS).

BUILDING ENERGY RENEWABLE ENERGY SYSTEMS

Some jurisdictions require each building or surrounding lot or building site to be equipped with at least one renewable energy system – solar photovoltaics, wind energy or solar water heating. UL's certifications and services related to renewable energy are covered in UL's **Alternate Energy Application and Marking Guide** at www.ul.com/markingguides.

WATER RESOURCE CONSERVATION AND EFFICIENCY

Green codes require a means be established for conserving water used indoors, outdoors and in wastewater conveyance. Specific plumbing appliances are required to limit water consumption. Water treatment devices and equipment are required to limit water consumption and address quality and efficiency.

PLUMBING APPLIANCE ENERGY EFFICIENCY

Household clothes washers listed under the Household Clothes Washers Verified for Energy Efficiency product category (ZZSR) and household dishwashers listed under the Household Dishwashers Verified for Energy Efficiency product category (ZYHZ) are investigated to verify their energy efficiency, and their consumption and efficient use of water.

WATER TREATMENT DEVICES AND EQUIPMENT

IgCC Section 704 requires specific water treatment devices and equipment to meet various standards. UL's Drinking Water Treatment Units product category (FDQD) covers point-of-use and point-of-entry drinking water treatment units intended to reduce specific health or aesthetic-related

chemical substances, particulates or microbiological contaminants from private or public drinking water supplies.

The basic standards used to investigate products in this category are NSF 42, 44, 53, 55, 58, 62 and 177. These standards establish minimum requirements for the design, materials, construction and performance of products such as cation exchange water softeners, activated carbon filter systems, reverse osmosis drinking water treatment systems, ultraviolet microbiological water treatment systems, drinking water distillation systems, and their components. Products covered under NSF 44 are intended to be used for the removal of hardness and the reduction of specific contaminants from public or private drinking water supplies. Products covered under NSF 58 are intended for the reduction of total dissolved solids and specific contaminant substances that may be present in public drinking water supplies.

INDOOR ENVIRONMENTAL QUALITY AND COMFORT

Areas covered by indoor environmental quality and comfort requirements include material emissions and pollutant control, fuel-fired appliances, and sound transmission.

MATERIAL EMISSIONS AND POLLUTANT CONTROL

An interior environment that is conducive to the health and well-being of building occupants and construction personnel is what is intended by the IGCC. People spend over 90 percent of their time indoors where they may be exposed to thousands of airborne pollutants. Products and materials indoors release volatile organic compounds (VOCs) and particles into the air that may negatively affect human health or result in unacceptable odors. VOCs are chemicals used to manufacture and maintain building materials, interior furnishings, cleaning products and personal care products. “Volatile” means that at room temperature these chemicals evaporate or can easily get into the air.

Inadequate ventilation, high temperatures and high humidity levels increase concentrations of some pollutants, leading to indoor air pollution levels up to 1000 times higher than those outdoors. The United States Environmental Protection Agency (U.S. EPA), the American Lung Association, the World Health Organization, and other public health and environmental organizations view indoor air pollution as one of the greatest risks to human health. There may be anywhere from 50 to hundreds of individual VOCs in the indoor air of a building.

Studies from around the globe (see below for links to some of these) continue to show that exposure to high levels of harmful chemicals in our indoor environment can cause not only severe discomfort, but headaches, nose bleeds, increased asthma attacks, the onset of asthma, and potential long-term health effects. High levels of chemical exposure have even led to an increase in C-reactive protein levels in human subjects, which is the body’s response to inflammation. Once airborne, VOCs can be easily inhaled by building occupants and trigger a number of health problems.

<http://www.environment.gov.au/atmosphere/airquality/publications/sok/chapter10.html>

<http://www.iaqscience.lbl.gov/pdfs/voc-1.pdf>

http://oem.bmj.com/content/52/6/388.abstract?ijkey=a259a5df5523262ebc77dbf9c265a51aa6d71686&keytype2=tf_ipsecsha

<http://www.springerlink.com/content/6y4q8y2yv4akrqc9/>

http://erj.ersjournals.com/content/20/2/403.abstract?ijkey=0fa737bd14c56216d6cda0c24409c8f3b4686dc7&keytype2=tf_ipsecsha

http://erj.ersjournals.com/content/20/2/403.abstract?ijkey=0fa737bd14c56216d6cda0c24409c8f3b4686dc7&keytype2=tf_ipsecsha

<http://www.bioportfolio.com/resources/pmarticle/76147/Volatile-Organic-Compounds-Exposure-And-Cardiovascular-Effects-In-Hair-Salons.html>

<http://onlinelibrary.wiley.com/doi/10.1111/j.1600-0668.2010.00673.x/abstract>

What Contributes to Poor Indoor Air Quality?

Chemicals — The primary sources of indoor exposure to airborne chemicals are products used in interior environments including furnishings, building materials, and other household and office products, that can emit thousands of VOCs and particles into the air. Of all the culprits that can affect indoor air quality, chemical emissions are the most harmful as they can contribute to a wide range of health effects.

Mold — Moisture problems are another common source of indoor air pollution as they can lead to indoor mold growth. Mold can also emit VOCs and particulates, compromising indoor air quality and leading to negative health effects. Since it is impossible to eliminate mold spores, the best way to reduce the impact of mold on indoor air quality is to prevent or promptly repair the moisture problems that enable mold growth.

Particulates — The particles emitted from products such as furnishings, building materials, and other household and office products are another source of indoor air pollution. Airborne particulates can also come from dirt and dust that is tracked in from outside. Particulates can trigger allergies and other respiratory problems in many people. Installing walk-off mats at doorways and changing air filters regularly are both good strategies to limit these pollutants.

Decreased Ventilation — Most of the buildings in which people spend the majority of their time are tightly sealed and insulated to keep out unconditioned outdoor air. Furthermore, most ventilation systems are designed to bring in very little outdoor air and instead recirculate the indoor air that has already been heated or cooled. While this strategy is effective for minimizing energy costs, it can have a negative impact on indoor air quality.

The Solution: Keep Pollutants Out in the First Place

Improving the quality of indoor air is vital for human health. The USEPA names source control as the best strategy to reduce indoor air pollution and limit chemical exposure. Source control can include selecting products that have been GREENGUARD Certified for low chemical emissions. Certified products are listed in the free GREENGUARD Product GuideSM at <http://greenguard.org/en/QuickSearch.aspx>.

Using GREENGUARD Certified products is among the most effective and easiest ways to help create healthier educational, healthcare, office and home environments. UL Environment's IAQ

Management Plan outlines requirements for managing indoor air quality during building construction. It can be used as a supplement to Master Specification Section One. This specification also provides instruction for selecting construction products, construction site management, construction sequencing, HVAC operation during construction, product installation, building flush-out and indoor air quality testing.

GREENGUARD Certification Types

GREENGUARD Indoor Air Quality Certified® — A product certification program for low-emitting building materials, furniture, furnishings, finishes, cleaning products, electronics and consumer products. All GREENGUARD Indoor Air Quality Certified products meet stringent certification requirements and must undergo both annual re-certification and quarterly quality monitoring to ensure ongoing compliance. Certified products are showcased in the free **GREENGUARD Product Guide**

GREENGUARD Children & Schools CertifiedSM — A product certification program for low-emitting building materials, furniture, finishes, cleaning products, electronics and consumer products used in environments where children and other sensitive populations spend extended periods of time. All GREENGUARD Children & Schools Certified products meet the stringent GREENGUARD Children & Schools Certification requirements, including limits outlined in California’s Department of Public Health Services Standard Practice for Specification Section 01350, and undergo both annual re-certification and quarterly quality monitoring to determine ongoing compliance. Certified products are displayed in the free GREENGUARD Product Guide at <http://www.greenguard.org/en/QuickSearch.aspx>.

Products are tested for emissions of formaldehyde, volatile organic compounds (VOCs), aldehydes, respirable particles, ozone and other pollutants using stringent environmental chamber protocols. Specific measurements may vary, based on the requirements of a specific certification program and type of product. Testing takes place in dynamic environmental chambers designed to simulate product use in typical indoor environments. Environmental chamber operation and testing protocols follow scientific principles established by the US Environmental Protection Agency (EPA) and its Environmental Technology Verification Program, the American Society of Testing Materials (ASTM), the state of Washington, Germany’s Federal Environment Agency (Blue Angel Program), and other applicable government or industry programs. For technical details, visit the Testing Procedures as presented in the Technical Center at <http://www.greenguard.org/en/technicalCenter.aspx>.

GREENGUARD Children & Schools Certified products meet and exceed the California Section 01350 materials emissions specification requirements. The California Section 01350 specification was originally written on behalf of the California Sustainable Building Task Force for the design and construction of the state’s Capitol Area East End Complex in 2002 to 2003. Material testing for VOCs was a key element of this specification, requiring materials to meet exposure limits for VOCs with chronic reference exposure level (CREL) values. The material testing methodology and criteria became known as the “Standard Practice.” GREENGUARD product handling, testing and analysis procedures have been harmonized with California Section 01350. In addition, any product certified within the GREENGUARD Children & Schools Program meets health-based criteria including one-half of the CA CRELs called out in CA 01350. All GREENGUARD Children & Schools Certified products meet these requirements and are recognized as suitable for use in all major sustainable

building rating systems or codes or any other building program recognizing California Section 01350.

FUEL-FIRED APPLIANCES

Gasketed Fireplace Doors

The 2012 IECC and the 2012 International Residential Code require gasketed doors on wood-burning fireplaces. Gasketed doors cannot be retrofit onto an already-installed factory-built fireplace unless this type of configuration is specifically indicated in the manufacturer's instructions, as this changes the combustion chamber from an open to a closed type. To date, UL has not investigated and certified such an arrangement.

Some factory-built fireplaces have been evaluated and certified with factory-installed gasketed doors. However, the use of these doors may require a Type HT chimney system, which would be detailed in the manufacturer's installation instructions.

Gasketed fireplace doors retain more heat within a firebox during the operation of the fireplace as compared to units with nongasketed doors. The increased heat raises the outside surface temperatures of a firebox, which may affect the clearances of the fireplace to combustible materials within walls and floor, and to trim and finish material, such as mantles. Only those fireplaces that have been evaluated with gasketed fireplace doors are identified in the installation instructions.

Factory-built wood-burning fireplaces are certified in accordance with UL 127, the Standard for Safety for Factory-Built Fireplaces, which is consistent with requirements in the International Mechanical Code and the Uniform Mechanical Code. These fireplaces are intended to be installed and used in accordance with the product Listing and the manufacturer's installation instructions.

Biomass-Burning Appliances

Biomass and pellet stoves and inserts, as covered in IgCC Section 804.1.3, are listed under the Solid-Fuel Type Room Heaters product category (DGAW) in accordance with UL 1482. Solid-fuel-burning air heaters designed for connection to a supply-and-return air duct system are listed under the Solid-fuel-fired Central Furnaces product category (LBHZ) in accordance with UL 391.

Factory-built, manually and/or automatically fueled, solid-fuel-fired hydronic heating appliances and boiler assemblies that burn biomass are listed under the Solid-fuel-fired Hydronic Heating Appliances and Boiler Assemblies product category (KXBW). Biomass water heaters are listed under the Solid-fuel-fired Water Heaters product category (LVHO). Products under both of these product categories are listed in accordance with UL 2523.

ACOUSTICS (SOUND TRANSMISSION)

Some green codes require buildings and tenant spaces to comply with minimum sound transmission class and maximum sound level requirements.

In addition to the fire-resistance ratings, where indicated in the individual designs under the Fire Resistance Ratings product category (BXUV), the Sound Transmission Class (STC) rating is published for those designs where the sound transmission loss (STL) test was also investigated in accordance with ASTM E90. The STC rating applies to the assembly of materials as indicated in the individual designs.

The following products have been investigated by UL in accordance with ASTM E90 and/or ASTM E492, where indicated in the individual Classifications:

- Suspension systems for ceiling membrane materials, direct or indirect supporting members for surfacing materials and support members for glazing in the Framing Members product category (CIKV)
- Concrete units, blocks and panels in the Precast Autoclaved Aerated Concrete Blocks product category (CFMW)
- Noncombustible panels used as a combination subfloor and underlayment in the Structural Cementitious Floor-sheathing Panels product category (CIYX)

Precast autoclaved aerated concrete is a lightweight precast building material with a uniform cellular structure intended for use in floor, roof and wall assemblies. Structural cementitious floor-sheathing panels are intended to be installed over cold-formed steel framing in interior locations.

The Sound Transmission Class (STC) is determined by ASTM E90. The STC is published as a single number (such as 50) and is applicable to the assembly of materials noted in the designs in the individual Classifications.

The Impact Insulation Class (IIC) is determined by ASTM E492. The IIC is published as a single number (such as 28) and is applicable to the assembly of materials noted in the designs in the individual Classifications.

Where indicated in the individual Classifications of acoustical materials under the Acoustical Materials product category (BIYR), these Classified products have been investigated to ASTM E423, ASTM E1414, and/or ASTM E1111. The Classifications are confined to the materials themselves and to the methods of application indicated and do not pertain to the structures in which the materials may be installed.

The noise reduction coefficient (NRC) is determined by ASTM C423. The NRC is published as a single number, such as 0.60.

The ceiling attenuation class (CAC) is determined by ASTM E1414. The CAC is published as a single number such as 32.

The articulation class (AC) is determined by ASTM E1111. The AC is published as a single number such as 170.

APPENDIX A: UL PRODUCT CATEGORIES FOR THE IGCC AND IECC

UL certifies products and continues to develop new product categories to address sustainability issues, without compromising safety. Below is a list of product categories in which UL certifies products suitable for the IgCC and IECC. Each product category is tabulated with a UL Category Code or a link to a certification database. By clicking on the code, you will be linked to the UL Guide Information for the category and any Listings or Classifications under that Product Category in the UL Online Certifications Directory at www.ul.com/database. The UL Guide Information may provide information or a link to additional safety related UL Guide Information.

Information on validated and certified products addressing the requirements in Sections 304.1, 503.2.3, and 508.3 of the IgCC is located in UL Environment’s Database of Validated and Certified Products, at www.ulenvironment.com/database. This online tool allows users to quickly sort and identify products by product category, company name, product name or type of claim. This database also includes products evaluated to ENERGY STAR® requirements.

For more information and to view a complete list of certified products for product emissions, visit www.greenguard.org.

Category Code	Category Name	Standard Used
CONSTRUCTION		
TGFE	Roof coverings	ASTM C1549 & ASTM C1371
MATERIAL RESOURCE CONSERVATION AND EFFICIENCY		
SCKG	Commercial Refrigerant Recovery/Recycling Equipment	UL 1963 , Clean Air Act, Title VI, Section 608
QVBC	Commercial Refrigeration Recovery/Recycling Equipment Certified for Performance Characteristics in Accordance with the United States Clean Air Act	40CFR82.158 Clean Air Act, Title VI, Section 608
YXMTC	Exhaust Cleaning and Recycling Assemblies for Commercial Kitchen Exhaust Systems	ULC-S647
SCIJ	Commercial Refrigerant Recovery Equipment	UL 1963 , Clean Air Act, Title VI, Section 608
VBIE	Solvent Distillation Units	UL 2208
VBFY	Solvent Distillation Units for Use in Hazardous Locations	UL 2208
GLET	Halon Recovery/Recharge Equipment	UL 2006
OOLR	Compact fluorescent lamps (single-ended pin-base and screw-base) (Self-Ballasted Lamps and Lamp Adapters)	UL 1993

ENERGY CONSERVATION, EFFICIENCY AND ATMOSPHERIC QUALITY		
ENVR	Electric Motors Verified for Energy Efficiency, Nonregulated, Certified to IEEE, CSA or IEC Standards	CSA C390, CSA C747, IEC 60034-2-1, ANSI/IEEE 112, IEEE 114
ENVS	Electric Signs Verified for Energy Efficiency in Accordance with California Code of Regulations, Title 24, Part 6, Section 148	CCR, Title 24, Part 6, Section 148
ZWAA	Products Verified for Energy Efficiency in Accordance with United States Regulations or Standards	
ZWAT	Air Conditioners, Room Verified for Energy Efficiency	10CFR430 Appendix F
ZWBN	Packaged Liquid Chillers Verified for Energy Efficiency	AHRI 550/590
ZWHP	Dehumidifiers, Refrigeration Type Verified for Energy Efficiency	AHAM DH-1, 10CFR430 Appendix F
ZWKG	Electric Motors Verified for Energy Efficiency	US DOE 10CFR431
ZWKL	Electric Motors for Use in Hazardous Locations Verified for Energy Efficiency	US DOE 10CFR431
ZWMR	Fluorescent Lamp Ballasts Verified for Energy Efficiency	10CFR430 Appendix Q
ZWQL	Heating & Cooling Equipment Verified for Energy Efficiency	10CFR430 Appendix M
ZWRP	Ice Makers Verified for Energy Efficiency	AHRI 810, AHRI 820, and 10CFR431.136
ZXIX	Refrigerators, Commercial Verified for Energy Efficiency	AHRI 1200 and ASHRAE 72
ZXJL	Refrigerators, Freezers & Wine Chillers, Household Verified for Energy Efficiency	US DOE 10CFR430 Appendix A1 and ANSI/AHAM HRF-1
ZXTH	Water Heaters, Electric Storage Tank Verified for Energy Efficiency	US DOE 10CFR430 Appendix E
ZYAA	Products Verified for Energy Efficiency in Accordance with Canadian Regulations or Standards	
ZYAT	Air Conditioners, Room Verified for Energy Efficiency	CAN/CSA-C368.1
ZYBU	Packaged Liquid Chillers Verified for Energy Efficiency	CSA-C743
ZYDI	Beverage Vending Machines, Refrigeration Type Verified for Energy Efficiency	ASHRAE 32.1
ZYFX	Clothes Dryers, Household, Electric Verified for Energy Efficiency	CAN/CSA-C361
ZYHM	Dehumidifiers, Refrigeration Type Verified for Energy Efficiency	CAN/CSA C749
ZYKH	Electric Motors Verified for Energy Efficiency	CSA C390 or CSA C747
ZYKN	Electric Motors for Use in Hazardous Locations Verified for Energy Efficiency	CSA C390 or CSA C747
ZYLC	Exit Signs Verified for Energy Efficiency	CSA C860
ZYMA	Fans, Ceiling Suspended Verified for Energy Efficiency	CSA-C22.2 No. 9.0

ZYMV	Fluorescent Lamp Ballasts Verified for Energy Efficiency	CAN/CSA-C654
ZYOD	Furnaces, Gas- & Oil-fired Verified for Energy Efficiency	CGA-2.3
ZYQL	Heating & Cooling Equipment Verified for Energy Efficiency	CSA-C656
ZYRR	Ice Makers Verified for Energy Efficiency	CAN/CSA-C742
ZYWX	Lamps, General-service Fluorescent Verified for Energy Efficiency	CAN/CSA-C819
ZYXA	Lamps, Incandescent Reflector Verified for Energy Efficiency	CAN/CSA-C862
ZYXE	Lamps, Self-ballasted Compact Fluorescent & Ballasted Adapters Verified for Energy Efficiency	CAN/CSA-C861
ZZED	Transformers, Distribution, Dry & Liquid-filled Types Verified for Energy Efficiency	CSA C802.2
ZZKM	Ranges, Household Electric Verified for Energy Efficiency	CAN/CSA-C358
ZZLG	Refrigerators, Commercial Verified for Energy Efficiency	AHRI 1200 and ASHRAE 72
ZZLI	Refrigerators, Freezers & Wine Chillers, Household Verified for Energy Efficiency	CSA-C300
ZZTH	Water Heaters, Electric Storage Tank Verified for Energy Efficiency	CAN/CSA-C191
FTRZ	Energy metering and monitoring for electricity, gaseous fuels, liquid fuels, and renewable energy consumption	UL 916, NEMA C12 standards
PAZX	Energy management equipment	UL 916
FFTG	Electric vehicle charging equipment	UL 2202
FFWA	Electric vehicle supply equipment	UL 2594
GQHG	HVAC system controls	UL 1917
XAPX	Programmable thermostats	UL 873
LZTW	Energy recovery devices (Ducted Heat Recovery Ventilators)	UL 1812
LZUU	Energy recovery devices (Non-ducted Heat Recovery Ventilators)	UL 1815
WATER RESOURCES CONSERVATION AND EFFICIENCY		
FDQD	Drinking Water Treatment Units	NSF 42, NSF 44, NSF 53, NSF 55, NSF 58, NSF 62, NSF 177
ZZSR	Clothes Washers, Household Verified for Energy Efficiency	CAN/CSA-C360
ZYHZ	Dishwashers, Household Verified for Energy Efficiency	CSA-C373
INDOOR ENVIRONMENTAL QUALITY AND COMFORT		
AGGZ	Air filters (construction phase) (Electrostatic Air Cleaners)	UL 867
AJZV	Air filters (construction phase) (Air Filter Units)	UL 900
AKNT	Air filters (construction phase) (High-Efficiency, Particulate, Air Filter Units)	UL 586
ALEV	Air filters, mechanical	UL 900

AGGZ	Air filters. electrostatic	UL 867
AJZV	Air filters (ducted space conditioning)	UL 900
AKNT	Air filters, high efficiency	UL 586
DEAZ	Wood stoves and wood fireplace inserts (Solid-Fuel Type Room Heaters)	UL 1482
DEET	Factory-Built Fireplaces	UL 127
DEAQ	Fireplace chambers	UL 127
DGAW	Biomass stoves and inserts (Room Heaters, Solid Fuel Type)	UL 1482
DGAW	Pellet (biomass) stoves and furnaces (Solid-Fuel Type Room Heaters)	UL 1482
KXBW	Solid Fuel-Fired Hydronic Heating Appliances, Water Heaters, and Boilers	UL 2523
LVHO	Solid Fuel-Fired water heaters	UL 2523
LBHZ	Solid-fuel-fired Central Furnaces	UL 391
Greenguard Children's and Schools adhesives/ sealants	Adhesives and sealants	EPA Method 24, SCAQMD Method 304, 316A or 316B or CDPD/EHLB/Standard Method V.1.1
Greenguard Children's and Schools paints and coatings	Architectural paints and coatings	CDPD/EHLB/ Standard Method V.1.1
Greenguard Children's and Schools flooring	Floor coverings	CDPD/EHLB/ Standard Method V.1.1
Greenguard Children's and Schools ceiling systems	Acoustical ceiling tiles and wall systems	CDPD/EHLB/ Standard Method V.1.1
Greenguard Children's and Schools insulation	Insulation	CDPD/EHLB/ Standard Method V.1.1
BXUV	Sound transmission (wall assemblies)	UL 263 , ASTM E90 ASTM E492
CIKV	Sound transmission (wall assemblies) (Framing Members)	UL 263 , ASTM E90 ASTM E492
CFMW	Sound transmission (wall assemblies) (Fire Tests of Building Construction and Materials)	UL 263 , ASTM E90 ASTM E492
CIYX	Sound transmission (wall assemblies) (Fire Tests of Building Construction and Materials)	UL 263 , ASTM E90 ASTM E492
BIYR	Acoustical Materials	ASTM C423, ASTM E1414, ASTM E1111

APPENDIX B: UL PRODUCT CATEGORIES FOR THE ICC 700

UL certifies products and continues to develop new product categories to address the requirements in ICC 700. Each product category is tabulated with a UL Category Code. By clicking on the code, you will be linked to the UL Guide Information for the category and any Listings or Classifications under that product category in the UL Online Certifications Directory at www.ul.com/database. These products also have typically been evaluated for safety.

Category Code	Category Name	Standard Used
TGFE	Roof coverings, Solar Reflectance	ASTM C1371 ASTM C 1549
GPRT	Ceiling fans	UL 507
UZUW	Solar water heater system (Outline of Investigation for Solar Collectors)	UL Subject 1279
UZVY	Solar water heater system Controllers (Outline of Investigation for Solar Collectors)	UL Subject 1279
UZWT	Solar water heater system (Energy Transfer Units)	UL Subject 1279
UZWW	Solar water heater system Thermal Storage Units (Outline of Investigation for Solar Collectors)	UL Subject 1279,
UZWZ	Solar water heater system Alternative-energy Water-storage Tanks and Multi-energy Water Heaters (Household Electric Storage Tank Water Heaters) (Electric Booster and Commercial Storage Tank Water Heaters)	UL 174, UL 1453
DEET	Factory-built, wood-burning fireplaces (Factory-Built Fireplaces)	UL 127
DEAZ	Wood stove and fireplace inserts (Solid-Fuel Type Room Heaters)	UL 1482
DGAW	Pellet (biomass) stoves and furnaces (Room Heaters, Solid Fuel Type)	UL 1482
CZHF	Carbon monoxide alarms (Single and Multiple Station Carbon Monoxide Alarms)	UL 2034
XAPX	Programmable thermostat (Temperature-Indicating and -Regulating Equipment) (Automatic Electrical Controls for Household and Similar Use)	UL 873, UL 60730-1A
OOLR	Luminaires (lighting fixtures) and lamps (light bulbs)(Self-Ballasted Lamps and Lamp Adapters)	UL 1993
SHZZ	Refrigerators, dishwashers, washing machines (Household Refrigerators and Freezers)	UL 250
DMIY	Refrigerators, dishwashers, washing machines (Household Dishwashers)	UL 749

ZCTT	Refrigerators, dishwashers, washing machines (Electric Clothes Washing Machines and Extractors) (Electric Commercial Clothes-Washing Equipment) (Combination washer-dryers) (Electric Clothes Dryers) (Electric Commercial Clothes-Drying Equipment)	UL 2157, UL 1206, UL 2158, UL 1240
GPWV	Exhaust fans (Electric Fans)	UL 507
ZACT	Exhaust fans (Power Ventilators)	UL 705
ALLU	Duct insulation materials (Factory-Made Air Ducts and Air Connectors)	UL 181
Greenguard Children's and Schools adhesives/sealants	Adhesives and sealants	EPA Method 24, SCAQMD Method 304, 316A or 316B or CDPD/EHLB/Standard Method V.1.1
Greenguard Children's and Schools paints and coatings	Architectural paints and coatings	CDPD/EHLB/Standard Method V.1.1
Greenguard Children's and Schools flooring	Floor coverings	CDPD/EHLB/Standard Method V.1.1
Greenguard Children's and Schools ceiling systems	Acoustical ceiling tiles and wall systems	CDPD/EHLB/Standard Method V.1.1
Greenguard Children's and Schools insulation	Insulation	CDPD/EHLB/Standard Method V.1.1

APPENDIX C: UL PRODUCT CATEGORIES FOR THE GPMCS

UL certifies products and continues to develop new product categories to address the requirements in IAPMO's Green Plumbing and Mechanical Code Supplement (GPMCS). Each product category is tabulated with a UL Category Code. By clicking on the code, you will be linked to the UL Guide Information for the category and any certifications under that product category in the UL Online Certifications Directory at www.ul.com/database.

Category Code	Category Name	Standard Used
QMTX	Automatic Faucets	UL 1951 ASME
QNNK	Ceramic water closets	ASME A112.19.2
QNNP	Plastic Urinal Fixtures	IAPMO Z124.9
BRGU	Pipe insulation	UL 723
ZXTH	Water Heaters, Electric Storage Tank Verified for Energy Efficiency	10CFR430
UZWT	Solar heat exchanger	UL Subject 1279
ZDUZ	Water softener	UL 979
BRGU	Duct insulation	UL 723
ALKW	Duct closure systems	UL 181A
XAPX	Programmable thermostat	UL 873, UL 60730-1A
ZWQL	Heating & cooling equipment verified for energy efficiency	10CFR430 Appendix M
ZWHP	Dehumidifiers, refrigeration type verified for energy efficiency	AHAM DH-1, 10CFR430 Appendix F
ZWAT	Room air conditioners, verified for energy efficiency	10CFR430
LZTW	Ducted heat recovery ventilators	UL 1812
LZUU	Non-ducted heat recovery ventilators	UL 1815
OGOY	Laboratory hood	UL 1805
YXZR	Compensating grease hoods	UL 710

APPENDIX D: SUSTAINABILITY-RELATED CODES AND STANDARDS

This appendix provides a list of the model green construction codes and installation standards, UL Standards and Outlines of Investigations related to green construction, and standards developed by other organizations that are used by UL to evaluate and certify products.

Green products must be installed in accordance with model codes and installation standards. These codes require these products to be listed and labeled in accordance with applicable product standards.

UL sustainability standards are typically identified as Standards for Sustainability and are designed to support a continuing effort to improve and/or maintain environmental quality by reducing energy and materials consumption and by minimizing the impacts of pollution generated by the production, use and disposal of goods and services. Limitations applicable to the products covered by the standard are delineated in the scope section of the Standard. UL Standards are intended to:

- Identify requirements for evaluation of products and provide consistency in the application of these requirements.
- Provide guidance for development of products by manufacturers.
- Provide requirements compatible with nationally recognized installation codes

UL Outlines of Investigation are documents that contain the construction, performance and marking criteria used by UL to investigate a product when the product is not covered by the scope of an existing UL Standard. Outlines are not consensus documents and do not require review by a UL Standards Technical Panel (STP) or other external group.

Comments or proposals for revisions on any part of UL Standards may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's Online Collaborative Standards Development System (CSDS) at <http://csds.ul.com>.

Model Green Construction Codes and Installation Standards	
ASHRAE 189.1	Standard for the Design of High-Performance Green Buildings Except Low Rise Residential
GPMCS	Green Plumbing and Mechanical Code Supplement
ICC 700	National Green Construction Standard
IECC	International Energy Conservation Code
IgCC	International Green Construction Code
NFPA 3	Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems
UL Standards and Outlines of Investigation	
GEI MMS1001	GREENGUARD Building Construction Standard
GGPS.001	GREENGUARD IAQ Standard for Building Materials, Finishes and Furnishings
GGPS.002	GREENGUARD Children & Schools Standard
GGTM.P040	Method for Measuring Microbial Resistance from Various Sources Using Static Environmental Chambers
GGTM.P066	Standard Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings Using Dynamic Environmental Chambers

ULE ISR 100	Interim Sustainability Requirements for Gypsum Boards and Panels
ULE ISR 102	Interim Sustainability Requirements for Door Leafs
UL 108	Environmental Claim Validation Procedure (ECVP) for Estimating Energy Savings for Energy Saving Power Strips
UL 126	Sustainability for Plastic Film Products
UL 391	Solid-Fuel and Combination-Fuel Central and Supplementary Furnaces
UL 773	Plug-In Locking Type Photocontrols for Use with Area Lighting
UL 773A	Nonindustrial Photoelectric Switches for Lighting Control
UL 916	Energy Management Equipment
UL 1482	Room Heaters, Solid Fuel Type
UL 1598B	Supplemental Requirements for Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires
UL SU 1615	Outline for Refrigerant Heat Recovery Units
UL 1812	Ducted Heat Recovery Ventilators
UL 1815	Nonducted Heat Recovery Ventilators
UL 1963	Refrigerant Recovery/Recycling Equipment
UL 1993	Self-Ballasted Lamps and Lamp Adapters
UL 2006	Halon 1211 Recovery/Recharge Equipment
UL 2523	Solid Fuel-Fired Hydronic Heating Appliances, Water Heaters and Boilers
UL SU 2735	Outline for Electric Utility Meters
UL 2760	Sustainability for Surface Coatings: Recycled Water-borne
UL 2761	Sustainability for Sealants and Caulking Compounds
UL 2762	Sustainability for Adhesives
UL 2763	Sustainability for Energy Efficient Harmonic Cancellation Transformers
UL 2764	Sustainability for Gas-Fired Condensing Hot Water Heating Boilers
UL 2765	Sustainability for Indirect Fired Domestic Hot Water Tanks
UL 2766	Sustainability for Energy Efficient Heating/Cooling Systems for Buildings
UL 2767	Sustainability for Paint and Varnish Remover
UL 2768	Sustainability for Architectural Surface Coatings
UL 2769	Sustainability for Corrosion Protection Control
UL 2770	Sustainability for Commercial Car Wash Services
UL 2777	Sustainability for Hard Floor Care Products
UL 2778	Sustainability for Products Made From Recycled Plastic
UL 2779	Sustainability for Dust Suppressants
UL 2780	Sustainability for Urinal Blocks
UL 2781	Sustainability for Pool and Spa Water Treatment Products
UL 2782	Sustainability for Solid Biofuels
UL 2789	Environmental Claims Validation Procedure for Calculation of Estimated Recyclability Rate
UL 2791	Sustainability for Drain and/or Grease Trap Additives: Biologically-based
UL 2796	Sustainability for Odor Control Products
UL 2799	Environmental Claim Validation Procedure (ECVP) for Zero Waste to Landfill
UL 7001	Sustainability for Household Refrigeration Appliances

UL SU 3200	Outline for Performance Testing of Engine and Turbine Generators
UL 61215	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval
UL 61646	Thin-Film Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval
UL 62108	Concentrator Photovoltaic (CPV) Modules and Assemblies - Design Qualification and Type Approval
Other Standards Used for Evaluation	
10CFR430, Appendix A1	“Uniform Test Method for Measuring the Energy Consumption of Electric Refrigerators and Electric Refrigerator-Freezers,” of U.S. Department of Energy (DOE) Test Procedure 10CFR430, “Energy Conservation Program for Consumer Products,”
10CFR430, Appendix E	“Uniform Test Method for Measuring the Energy Consumption of Water Heaters,” of U.S. Department of Energy (DOE) Test Procedure 10CFR430, “Energy Conservation Program for Consumer Products.”
10CFR430, Appendix F	“Uniform Test Method for Measuring the Energy Consumption of Room Air Conditioners,” of U.S. Department of Energy (DOE) Test Procedure 10CFR430, “Energy Conservation Program for Consumer Products.”
10CFR430, Appendix M	“Uniform Test Method for Measuring the Energy Consumption of Central Air Conditioners and Heat Pumps,” of U.S. Department of Energy (DOE) Test Procedure 10CFR430, “Energy Conservation Program for Consumer Products.”
10CFR430, Appendix Q	“Uniform Test Method for Measuring the Energy Consumption of Fluorescent Lamp Ballasts,” of U.S. Department of Energy (DOE) Test Procedure 10CFR430, “Energy Conservation Program for Consumer Products.”
10CFR430, Appendix X	“Uniform Test Method for Measuring the Energy Consumption of Dehumidifiers,” of U.S. Department of Energy (DOE) Test Procedure 10CFR430, “Energy Conservation Program for Consumer Products.”
10CFR431	Energy Efficiency Program for Certain Commercial and Industrial Equipment
10CFR431.136	Energy Conservation Standards and Their Effective Dates
40CFR82.158	Standards for Recycling and Recovery Equipment
AHAM DH-1	Dehumidifiers
AHAM HRF-1	Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers
AHRI 550/590	Performance Standard for Rating of Water-Chilling Packages Using the Vapor Compression Cycle
AHRI 810	Automatic Commercial Ice Makers
AHRI 820	Ice Storage Bins
AHRI 1200	Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets
ASHRAE 32.1	Methods of Testing for Rating Vending Machines for Bottled, Canned, and Other Sealed Beverages
ASHRAE 72	Method of Testing Commercial Refrigerators and Freezers, “CGA-2.3, “Gas-Fired Central Furnaces
ASTM C423	Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

ASTM C1371	Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using a Portable Emisometer
ASTM C1549	Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
ASTM E90	Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
ASTM E492	Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine
ASTM E1111	Standard Test Method for Measuring the Interzone Attenuation of Ceiling Systems
ASTM E1414	Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
CCR, Title 24, Part 6, Section 148	California Building Standards Code; California Energy Code
CSA-C22.2 No. 9.0	General Requirements for Luminaires
CAN/CSA-C191	Performance of Electric Storage Tank Water Heaters for Domestic Hot Water Service
CSA-C300	Energy Performance and Capacity of Household Refrigerators, Refrigerator-Freezers, Freezers, and Wine Chillers
CAN/CSA-C358	Energy Consumption Test Methods for Household Electric Ranges
CAN/CSA-C360	Energy Performance, Water Consumption, and Capacity of Household Clothes Washers
CAN/CSA-C361	Test Method for Measuring Energy Consumption and Drum Volume of Electrically Heated, Household, Tumble-Type Clothes Dryers
CAN/CSA-C368.1	Performance Standard for Room Air Conditioners
CSA-C373	Energy Consumption Test Methods and Limits for Household Dishwashers
CSA C390	Energy Efficiency Test Methods for Three-Phase Induction Motors
CAN/CSA-C654	Fluorescent Lamp Ballast Efficacy Measurements
CSA-C656	Performance Standard for Split-System and Single-Package Central Air Conditioners and Heat Pumps
CAN/CSA-C742	Performance of Automatic Ice-Makers and Ice Storage Bins
CSA-C743	Performance Standard for Rating Packaged Water Chillers
CSA C747	Energy Efficiency Test Methods for Small Motors
CAN/CSA C749	Performance of Dehumidifiers
CSA C802.2	Minimum Efficiency Values for Dry-Type Transformers
CAN/CSA-C819	Performance of General Service Fluorescent Lamps
CSA C860	Performance of Internally Lighted Exit Signs
CAN/CSA-C861	Performance of Self-Ballasted Compact Fluorescent Lamps and Ballasted Adapters
CAN/CSA-C862	Performance of Incandescent Reflector Lamps
IEC 60034-2-1	Rotating Electrical Machines - Part 2-1: Standard Methods for Determining Losses and Efficiency from Tests (Excluding Machines for Traction Vehicles)
ANSI/IEEE 112	Standard Test Procedure for Polyphase Induction Motors and Generators
IEEE 114	Standard Test Procedure for Single-Phase Induction Motors
NSF 44	Cation Exchange Water Softeners
NSF 58	Reverse Osmosis Drinking Water Treatment Systems

Appendix B

UL Online Certifications Directory Quick Guide

Free of charge to all users, UL's Online Certifications Directory is an electronic, "intelligent" version of our renowned UL Product Directories. Updated daily, the Online Certifications Directory has advanced search capabilities and, for most product categories, contains more information about product Listings than is available in print.

Log on to the UL Online Certifications Directory today at www.ul.com/database to verify UL Certifications.

The following UL Online Certifications Directory Quick Guide provides tips for searching UL's Online Certifications Directory using various types of information such as company name, UL File Number, model number, etc.

Contact your local Regulatory Services Representative for further assistance with the UL Online Certifications Directory.

UL's Online Certification Directory Quick Guide

Welcome to the UL Online Certifications Directory, a faster way to access UL Certifications. You can use the UL Online Certification Directory to:

- Verify a UL Certification
- Verify a UL Certified product use
- Verify a product safety standard

Search The UL Online Certification Directory Using: General Searches

- Company name/location and/or Keywords
- Standard Number
- UL File Number
- UL Category Code

Specific Searches

- Appliance Wiring Material (AWM)
- Authorized Label Supplier Label Type
- Component Supplier
- Components for Transportation Applications
- Fire-resistance-rated Systems & Products
- Food Safety Equipment
- Registered Firms
- Sprinkler Identification Number (SIN)

To begin, log on to www.ul.com.

To access the UL Online Certifications Directory, click "Certifications" located in the red bar at the top right of the page. Or for direct access go to www.ul.com/database.

Search By Company Name:

To begin a search for information regarding a specific company, enter the company name and other available information in the fields provided, and then click "Search".

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BEGIN A BASIC SEARCH

Company Name

City

U.S. State

U.S. Zip Code

Country

Region

Keyword

ABOUT THE OCD

You can use the UL Online Certification Directory to:

- Verify a UL Listing or Classification
- Verify a UL Listed product use
- Verify a product safety standard

Learn more with the QuickGuide to the OCD

SPECIFIC / ADVANCED SEARCHES

LINKS OF INTEREST

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Search results often yield multiple "hits," which are listed in alphabetical order by Company Name.

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Search results

Number of hits: 110 The maximum number of hits returned is 5000.

You may choose to [Refine Your Search](#).

Company Name	Category Name	Link to File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File
SAMPLE COMPANY NAME	Direct Plug-in and Cord-connected Class 2 Power Units	Sample File
SAMPLE COMPANY NAME	Audio and Video Equipment	Sample File

To reduce the number of "hits," choose "Refine Your Search."

To refine, enter additional information in the "Keyword" field and click "Search".

Refining using multiple pieces of information is possible by using "and", "or" and "not" statements, and wildcards as demonstrated through the "Search Tips" link or the following Tips for Effective Searches:

TIPS FOR EFFECTIVE SEARCHES

Select a search method

- Match all words - type AND between words (i.e., display and nwgg)
- Match any word - type OR between words (i.e., hair dryer or blow dryer)
- Match phrase(s) - type exact phrase (i.e., washing machine)
- Exclude a word - type NOT before word (i.e., roof panel not metal)
- Match a partial word or phrase - To replace any characters or words that you may not know, add an asterisk (*) in the middle or at the end of the characters or words in your search.

Examples

- Company Name - company*
- Keyword - submersible*

Once the number of "hits" has been reduced, click on the appropriate link in the "Link to File" column to view the company's current Certification(s) or refine further by again clicking "Refine Your Search."

Number of hits: 15 The maximum number of hits returned is 5000.		
You may choose to Refine Your Search.		
Company Name	Category Name	Link to File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File

The electronic Certifications contain the same, if not more, UL Certification information than is available in the printed directory.

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PGJ18.MH27528
Printing Materials Certified for Canada - Component

[Page Bottom](#)

Printing Materials Certified for Canada - Component

See [General Information for Printing Materials Certified for Canada - Component](#)

SAMPLE COMPANY
 333 Any street
 Northbrook, IL 60062
 USA

Label materials suitable for imprinting using one or more of the following combinations of printers and ink.

Printer/Ink Combinations

1. **Armor SA "AXR-7+" or "AXR-600", Autronics Co., Ltd. "HD", Dynic "CD-20", Ricoh Co., Ltd. "B110C" or**

To view the description/specifications for the category, click the “See General Information for...” link located above the company name.

Note: wording may read “Guide Information for ...” in place of General Information.

UL Guide Information outlines the scope and limitations of a product category, the Standard for Safety used to evaluate products, and the applicable UL Mark by which the products can be identified in the field. View the next level of Guide Information by again clicking the “See General Information for...” link.

Search By Keyword:

This “Keyword” search function will search the entire Online Certification Directory database. Using the “Search Tips” provided, enter the available information and click “Search”.

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To conduct a search, fill in as much information as you have.

Keyword:

[Search Tips](#) [Disclaim](#)

[Copyrig](#)

Refine your search or click the appropriate link in the “Link to File” column.

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Search results

Number of hits: 110 The maximum number of hits returned is 5000.		
You may choose to Refine Your Search .		
Company Name	Category Name	Link to File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File
SAMPLE COMPANY NAME	Direct Plug-in and Cord-connected Class 2 Power Units	Sample File
SAMPLE COMPANY NAME	Audio and Video Equipment	Sample File

Search by Standard Number:

This option searches all UL Guide Information for the requested standard number (UL and other). Your results, a list of product categories whose products were evaluated to or whose Guide Information references the standard.

To begin search, enter the exact standard (ASTM E84, UL 300, ANSI/NSF 61, etc.) number in the available “Standard Number” field and click “Search.”

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Search the category Guides by Standard Number --

Standard Number:

[Search Tips](#) [Disclaimer](#)

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This search results in the UL Guide Information for one or more categories. Choose the correct category by clicking the “GuidelInfo” link in the “Link to File” column.

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Search results

Number of hits: 1 The maximum number of hits returned is 5000.		
You may choose to Refine Your Search .		
Company Name	Category Name	Link to File
Guide Information	Fire Door and Window Frames	GVTV.GuideInfo

Model number information is not published for all product categories. If you require information about a specific model number, please contact Customer Service for further assistance.

Note: If your search does not result in any “Hits”, try it again using only the number (i.e. E84, 300, 61, etc.).

Search By UL File Number:

A “File Number” is an alphanumeric designation (e.g. E12346, MH3456, R4600, etc.) assigned by UL and associated with a specified company and product category.

To search by “File Number”, first use the drop-down menu on the main page.

The screenshot shows the UL Online Certifications Directory search interface. On the left, there is a 'BEGIN A BASIC SEARCH' form with fields for Company Name, City, U.S. State (dropdown), U.S. Zip Code, Country (dropdown), Region (dropdown), and Keyword. On the right, there is an 'ABOUT THE OCD' section and a 'SPECIFIC / ADVANCED SEARCHES' dropdown menu. The dropdown menu is open, showing options: Keyword, UL File Number (highlighted), UL Category Code, Standard Number, Appliance Wiring Material (AWM), Authorized Label Suppliers, Component Suppliers, and Components for Transportation Applications.

Next, enter the file number and click “Search”.

The screenshot shows the UL Online Certifications Directory search interface after a search. The search bar contains 'UL File Number (E12345):' and the 'SEARCH' button is highlighted. Below the search bar, there are links for 'Search Tips' and 'Disclaimer'. At the bottom, there is a copyright notice: 'Copyright © 2005 Underwriters Laboratories Inc.'

As in the previous example, click the appropriate File Number link in the “Link to File” column.

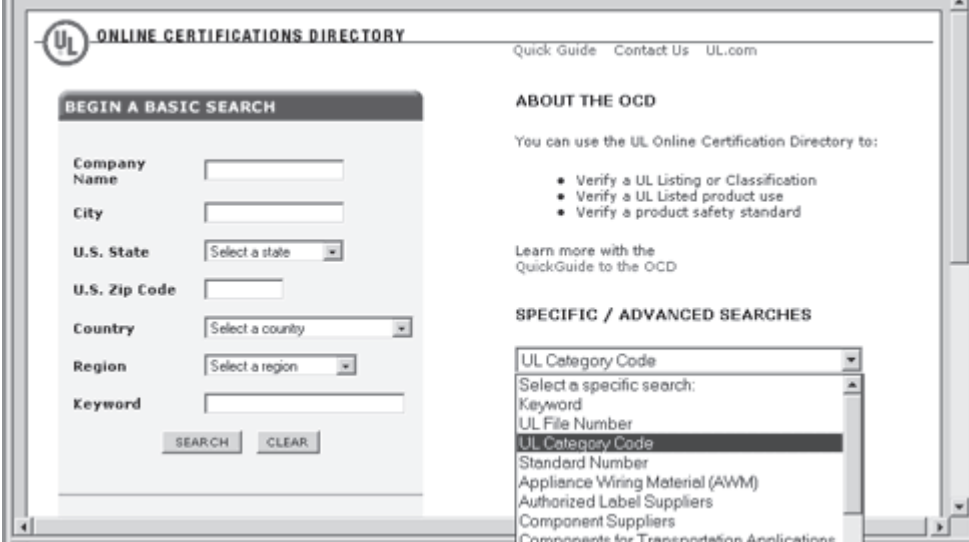
The screenshot shows the UL Online Certifications Directory search results page. The search results are displayed in a table with three columns: Company Name, Category Name, and Link to File. The table contains three rows of sample data.

Company Name	Category Name	Link to File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File

Search by UL Category Code:

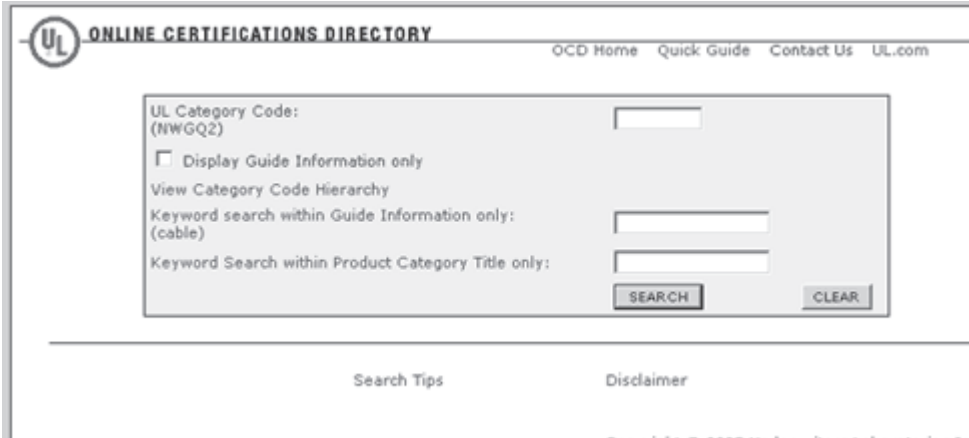
“Category Code” allows for four search options. They are 1) UL Category Code, 2) Keyword search within Guide Information only, 3) Keyword Search within Product Category Title only, and 4) Category Code Hierarchy view.

A UL Category Code is an alphanumeric designation (GBTV, QMFZ2) assigned by UL and associated with a specific product category. To search by UL Category Code, use the drop-down menu on the main page.



The screenshot shows the 'ONLINE CERTIFICATIONS DIRECTORY' search interface. On the left, there is a 'BEGIN A BASIC SEARCH' section with input fields for Company Name, City, U.S. State (a dropdown menu), U.S. Zip Code, Country (a dropdown menu), Region (a dropdown menu), and Keyword. Below these fields are 'SEARCH' and 'CLEAR' buttons. On the right, there is an 'ABOUT THE OCD' section with a list of uses: 'Verify a UL Listing or Classification', 'Verify a UL Listed product use', and 'Verify a product safety standard'. Below that is a 'SPECIFIC / ADVANCED SEARCHES' section with a dropdown menu currently showing 'UL Category Code' and a list of other search options: 'Keyword', 'UL File Number', 'Standard Number', 'Appliance Wiring Material (AWM)', 'Authorized Label Suppliers', 'Component Suppliers', and 'Components for Transmittance Applications'.

To search for keywords in either the Guide Information or product category title, enter the information in the respective “Keyword search within Guide Information Only” “or “Keyword search within Product Category Title only” field and click “Search.” **Note:** This “keyword” search function searches only the UL Guide Information. To search for keyword(s) throughout the entire database, use the Keyword option described in full below.



This screenshot shows a more detailed search interface. At the top, it says 'ONLINE CERTIFICATIONS DIRECTORY' and 'OCD Home Quick Guide Contact Us UL.com'. The main search area contains a 'UL Category Code: (NWGQ2)' field with an input box. Below this is a checkbox labeled 'Display Guide Information only' which is currently unchecked. There is a link 'View Category Code Hierarchy'. Below that are two input fields: 'Keyword search within Guide Information only: (cable)' and 'Keyword Search within Product Category Title only:'. At the bottom of this section are 'SEARCH' and 'CLEAR' buttons. At the very bottom of the page, there are links for 'Search Tips' and 'Disclaimer', and a copyright notice: 'Copyright © 2005 Underwriters Laboratories Inc.'.

To search for the UL Guide Information for a specific category code, enter the category code in the available “Category Code” field, click the “Display Guide Information Only” box and then click “Search”.

Note: Omitting the “Display Guide Information Only” box will result in the UL Guide Information AND all current Certifications for a given category code.

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UL Category Code: (NWGQ2)

Display Guide Information only

View Category Code Hierarchy

Keyword search within Guide Information only: (cable)

Keyword Search within Product Category Title only:

[Search Tips](#) [Disclaimer](#)

This search results in the UL Guide Information for one or more categories. Choose the correct category by clicking the "GuideInfo" link in the "Link to File" column.

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Search results

Number of hits: 1 The maximum number of hits returned is 5000.		
You may choose to Refine Your Search .		
Company Name	Category Name	Link to File
Guide Information	Fire Door and Window Frames	GVTV.GuideInfo

Model number information is not published for all product categories. If you require information about a specific model number, please contact Customer Service for further assistance.

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To view all current UL Certifications for a Category Code from within the Guide Information, click "View Listings".

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GVTV.GuideInfo
Fire Door and Window Frames

[View Listings](#)

[Fire Doors] Fire Door and Window Frames

See General Information for Fire Doors

GENERAL

This category covers fire door frames, fire window frames, and twenty minute type door frames or window frames without hose stream.

Fire door and fire window frames are intended for the protection of openings in walls when installed in accordance with ANSI/NFPA 80, "Standard for Fire Doors and Fire Windows" and ANSI/SDI A250.11, "Recommended Erection Instructions for Steel Frames". Installation instructions are not required to be shipped with frames that are to be installed in accordance with ANSI/NFPA 80.

Click the appropriate link in the “Link To File” to view the individual UL Certifications.

 ONLINE CERTIFICATIONS DIRECTORY		
OCD Home Quick Guide Contact Us UL.com		
Search results		
Number of hits: 110 The maximum number of hits returned is 5000.		
You may choose to Refine Your Search .		
Company Name	Category Name	Link to File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File
SAMPLE COMPANY NAME	Printing Materials Certified for Canada - Component	Sample File
SAMPLE COMPANY NAME	Direct Plug-in and Cord-connected Class 2 Power Units	Sample File
SAMPLE COMPANY NAME	Audio and Video Equipment	Sample File

APPENDIX C - INDEX OF UL PRODUCT CATEGORIES AND INDUSTRY TERMS

This index includes all product categories sorted alphabetically. In addition, those product categories that are a sub-set of a main product category are indented under the main category to illustrate the grouping of a family of related categories. This index also includes specific product types covered within a product category and these product names are followed by the applicable product category in parentheses.

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A					
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Accessories for Commercial Refrigerator and/or Freezer (see Commercial Refrigerators and Freezers (SGKW))	380	Accessories for Wind Turbine Stand-alone Inverters (see Static Inverters, Converters and Accessories for Use in Independent Power Systems (QIKH))	342	Adapters (see Reinforced Thermosetting Resin Conduit (DZKT))	126
Accessories for Commercial Walk-in Units (see Walk-in Units, Commercial (SQTV))	385	Accessories for Wind Turbine Utility Inverters (see Static Inverters, Converters and Accessories for Use in Independent Power Systems (QIKH))	342	Adapters for Use in Hazardous Locations (see Conduit Fittings for Use in Hazardous Locations (EBNV))	129
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