2011 NEC Significant Changes

Courtesy of NFPA

Courtesy of NJATC

Presented By:
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Objectives

- Review significant revisions in the 2011 *NEC*
- Review new requirements (articles) in the 2011 *NEC*
- Review how the *NEC* applies to modifications and replacements
- Review some new rules for renewable energy systems.

2

Article 90

Introduction

3

90.2(B)(5) d.

- c. Are located in legally established easements or rights-of-way, or
- d. Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations.

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90.2(B)(5) d. [cont'd.]

- These installations shall be limited to:
- Federal lands, native American reservations through the U.S. Department of the Interior Bureau of Indian Affairs,
- Military bases, lands controlled by port authorities
- State agencies and departments, and lands owned by railroads.

6

Chapter 1

Article 100 Definitions

7

Arc-Fault Circuit Interrupter (AFCI)

- Definition relocated from 210.12 to Article 100.
- A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

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Photo Courtesy of Eaton Corporation

250.2 System Bonding Jumper

- Relocated and revised
- The connection between the grounded circuit conductor and the supply-side bonding jumper, or the equipment grounding conductor, or both, at a separately derived system.

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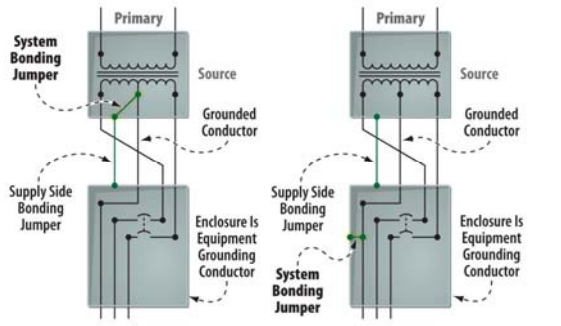

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Grounding Conductor

- The definition has of the term grounding conductor has been deleted.
- Two similar definitions of this conductor are unnecessary.
- Rules have been revised where the term previously was used.

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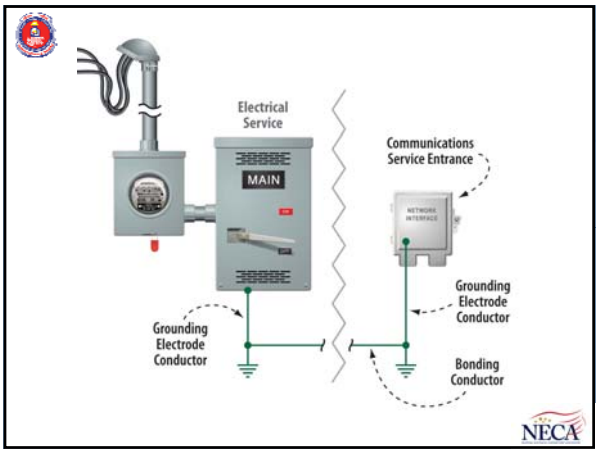

Chapter 1

Article 110 Requirements for Electrical Installations

14

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110.24 Available Fault Current

Service equipment to be field-marked with the maximum available fault current and dated.

Modifications that cause changes to the available fault current require updated AFC and date calculation was performed.

An exception is provided for industrial installations that provide conditions controlled by qualified persons.

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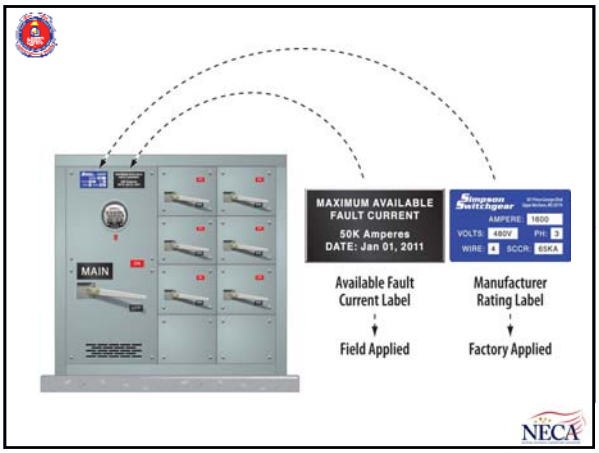

110.26(D) Illumination

- The words “and shall not be controlled by automatic means only” in the last sentence have been relocated to the first sentence of 110.26(D).
- The words “in electrical equipment rooms” have been removed from this section.
- The requirement applies to working spaces about electrical equipment.

17

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18

Chapter 2

Wiring and Protection

19

Article 210

Branch Circuits

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210.8 GFCI Protection for Personnel

- Dwelling Units. Ground-fault circuit interrupter devices shall be installed in a readily accessible location.
- Other than Dwelling Units. Ground-fault circuit interrupter devices shall be installed in a readily accessible location.

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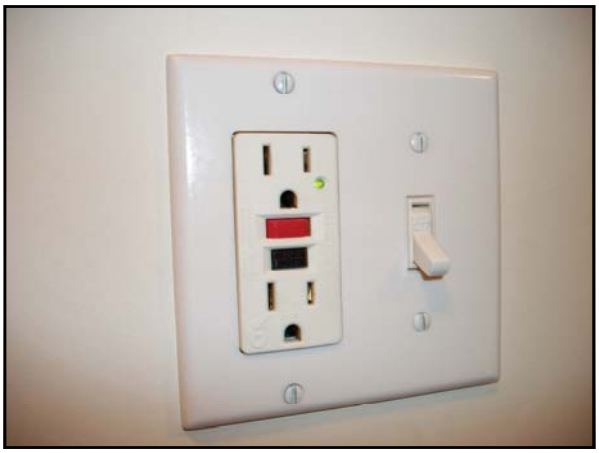

210.12(B) AFCI Protection

- MC cable added to the list of wiring methods permitted to the first outlet in the branch circuit.
- Exceptions 1 and 2 include new provisions for outlet-type AFCI protective devices installed at the first outlet.
- Exception 3 requires an individual branch circuit and permits MC cable as one of the wiring methods.

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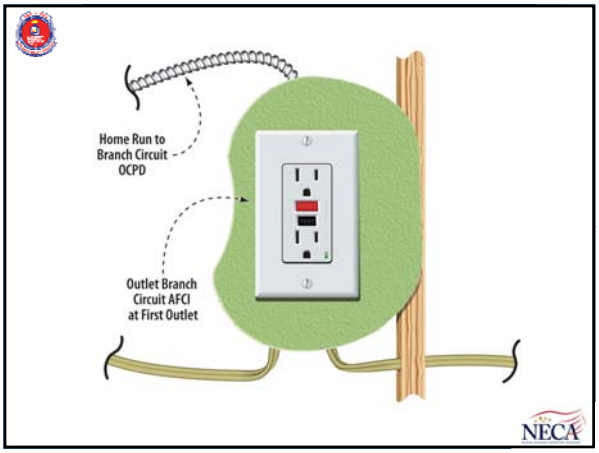

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Prototype Courtesy of Pass and Seymour/Legrand

230.72(A) Exception

- A new disconnecting means marking requirement is addressed in the exception.
- A plaque is required to be posted at the grouped service disconnects.
- Indicates that a service disconnect for a fire pump is remote and provides the location.

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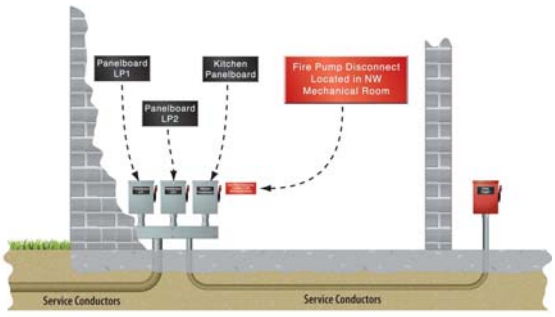

Section 240.87 [new]

This new section addresses non-instantaneous trip circuit breakers operating characteristics and methods to reduce energy levels when equipment has to be worked on, tested, inspected, or maintained while energized.

The three methods are provided to reduce energy levels.

28

240.87 (cont.)

1. Use zone-selective interlocks between overcurrent devices
2. Differential relaying
3. Energy reducing maintenance switch with status indication

Photo Courtesy of Eaton Corporation

29

240.91(B) Device Rated Over 800 Amperes

- Permits conductors in circuits over 800 amperes to have overcurrent protection applied above their rated capacity.
- Applies to equipment listed and marked for this use where conductors are protected within the time/current conductor withstand ratings.
- Applies only in supervised industrial installations

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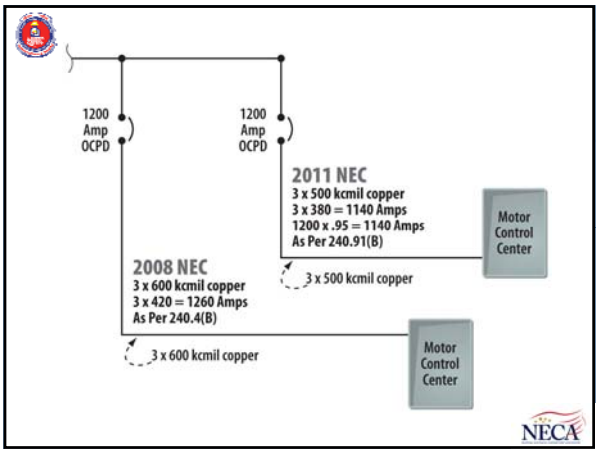

Article 250

Grounding and Bonding

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250.2 Bonding Jumper, Supply-Side

- A reliable conductor installed on the supply side of a service or separately derived system to ensure the required electrical conductivity between metal parts required to be electrically connected.

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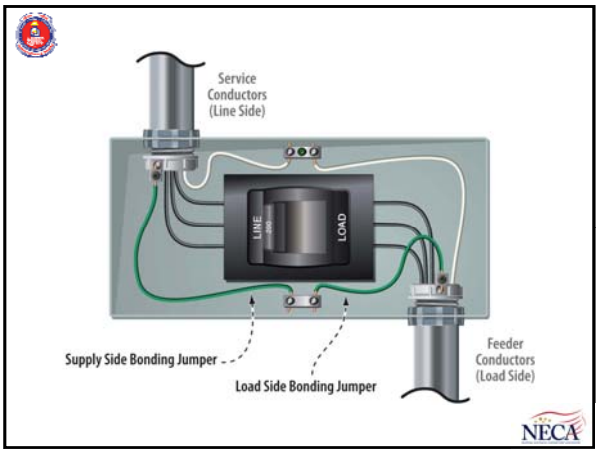

Section 250.30(A) [Revision]

This section has been reorganized and revised.

The system bonding jumper cannot extend beyond the enclosure where it originates. The connection of a grounding electrode conductor tap to a common grounding electrode conductor must be made with a connector listed as grounding and bonding equipment.

Outdoor sources require a grounding electrode connection at the source location outside the building.

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Section 250.121 [new]

This new rule restricts equipment grounding conductors from being used as both grounding electrode conductors and equipment grounding conductors.

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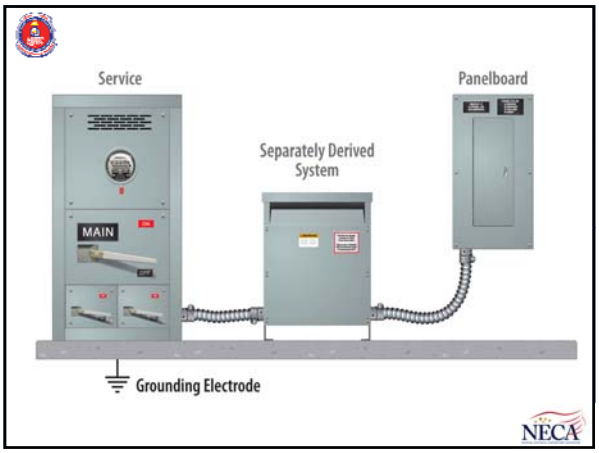

Section 250.190 [revision]

This section has been revised to clarify that cable copper screen or ribbon shield or combination of both is not to be used as an equipment grounding conductor unless it is rated for the ground fault current.

The revision clarifies when separate equipment grounding conductors must be installed with circuits of 1000 volts and greater.

38

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250.191 Grounding System at AC Substations

- For ac substations, the grounding system shall be in accordance with Part III of Article 250.
- Informational Note: For further information on outdoor ac substation grounding, see ANSI/IEEE 80-2000, IEEE *Guide for Safety in AC Substation Grounding*.

40

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Chapter 3

Wiring Methods and Materials

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312.8 [New List Item (3)]

- A warning label is applied to the enclosure that identifies the closest disconnecting means for any feed through conductors.

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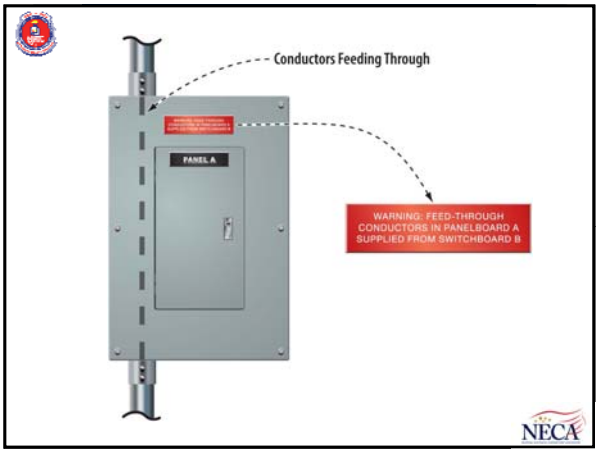

328.14 Installation

- Type MV cable shall be installed, terminated, and tested by qualified persons.
- Informational Note refers users to IEEE 576.

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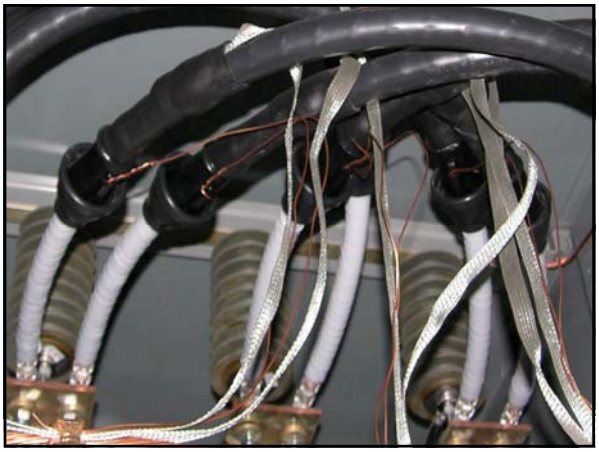

Article 399 [New]

This new article provides the requirements for overhead conductors outside that are installed for systems operating at over 600 volts.

Many overhead electrical infrastructures operating over 600 volts are customer-owned and outside of the control of serving utility companies.

The *NEC* has been expanded to provide new rules that apply to overhead conductor installations.

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Chapter 4

Equipment for General Use

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404.2(C) Switches Controlling Lighting Loads

- Grounded conductor is required at switches controlling lighting loads
- Exceptions provided for wiring installed in a raceway system or for cable assembly wiring if the cable is accessible

51

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Article 406

Receptacles, Cord Connectors, and Attachment Plugs (Caps)

52

406.4(D) [Revision]

New list items (4), (5), and (6)

(4) Receptacle replacements made at receptacle outlets that are required to be AFCI protected, arc-fault circuit-interrupter protected receptacles must be provided.

(5) Receptacle replacements made at outlets required to provide tamper-resistant receptacles, the replacement receptacle shall be a tamper-resistant type.

53

Prototype Courtesy of Pass and Seymour/Legrand

406.4(D) [Revision] (cont.)

(6) Receptacle replacements made at outlets that require weather-resistant receptacles, the receptacles must be of the weather-resistant type.

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Courtesy of Pass and Seymour/Legrand

Section 406.11 [Revision]

The requirements for tamper-resistant receptacles have been expanded beyond dwelling units.

A new subdivision (B) has been added that requires tamper-resistant receptacles in all public areas where children are predominately present, such as daycares, classrooms, churches, restaurants, restrooms, bathrooms, playrooms, activity rooms, playgrounds, swimming pools, and as described in 517.18 (C).

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406.12 [4 New Exceptions]

- Receptacles located more than 5-1/2 ft above the floor
- Receptacles that are part of a luminaire or appliance
- A single receptacle or a duplex receptacle for two appliances located within dedicated space for each appliance
- Non-grounding receptacles used for replacements as permitted in 406.4(D)(2)(a).

58

406.13 Tamper-Resistant Receptacles

- Tamper-Resistant Receptacles in Guest Rooms and Guest Suites.
- All nonlocking type, 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.

Courtesy of Pass and Seymour/Legrand

59

Article 408

Switchboards and Panelboards

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Section 408.3(F)(2) [New]

- This revision incorporates a new requirement to field-mark switchboards and panelboards that are supplied by ungrounded systems (sources). The new rule includes specific language that must be used on the labels that warn users of the ungrounded system and what the operating voltage is. The label has to include the following wording:

Caution Ungrounded System Operating _____ Volts Between Conductors

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Section 408.4 [Revision]

This section has been revised by adding a new subdivision (B) that requires each switchboard or panelboard to be field-marked as to where the power supplying the equipment originates.

The title of this section has also been changed from “Signage” to “Field Identification Required.”

63

Article 410

Luminaires, Lampholders, and Lamps

65

Article 410 [Revisions]

Light Emitting Diode - LED Technologies)

Changes accepted throughout Article 410 result in rules regarding light-emitting diode (LED) technologies being address in the NEC.

This technology has evolved to the stage where luminaires and lighting systems are being manufactured using LEDs driven by electronic power supplies.

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410.130 Disconnecting Means

- For existing luminaires, at the time a ballast is replaced, a disconnecting means shall be installed.

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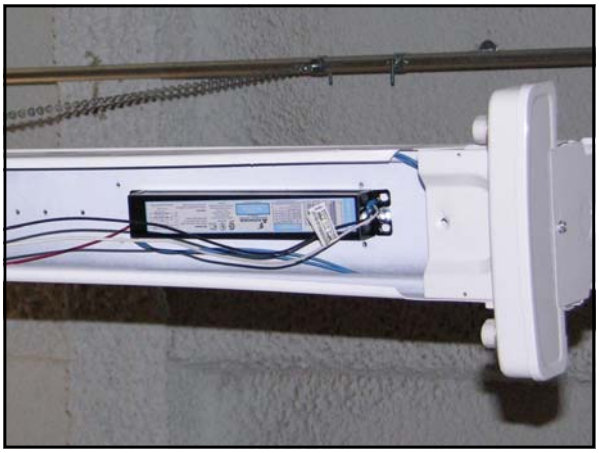

Article 450

Transformers

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450.14 [New]

This new section in Article 450 provides a requirement for installing a disconnecting means in the primary supply of a transformer and it must generally be located in sight from the transformer.

The new rule also includes an option for locating the disconnecting means out of sight from the transformer, but is has to be capable of being locked in the open position.

71

Chapter 5

Special Occupancies

74

514.11(A) [Revised]

Each circuit leading to or through dispensing equipment, including all associated power, communication, data, and video circuits, and equipment for remote pumping systems, shall be provided with a clearly identified and readily accessible switch

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517.16 Receptacles with Insulating Grounding Terminals

Isolated grounding-type receptacles are not permitted to be installed in patient care locations.

Courtesy of Pass and Seymour/Legrand

77

517.20 Wet Procedure Locations

Wet procedure patient care areas shall be provided with special protection against electric shock by one of two methods:

1. Isolated power systems in accordance with 517.160

2. Power distribution system that provides GFCI protection if the ground fault current exceeds 6 mA

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Chapter 6

Special Equipment

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Article 625

Electric Vehicle Charging System

82

625.2 Plug-in Hybrid Electric Vehicle (PHEV)

A hybrid vehicle intended for on-road use with the ability to store and use off-vehicle electrical energy in the rechargeable energy storage system.

The PHEV also has a second source of motive power.

Plug-in Hybrid Electric Vehicle (PHEV)

83

Electric Vehicle Inlet

- The device on the electric vehicle into which the electric vehicle connector is inserted for power transfer and information exchange.

84

625.2 Rechargeable Energy Storage System

- Any energy storage system that has the capability to be charged and discharged.
- Examples include batteries, capacitors, and electromechanical flywheels.

86

Installation by Qualified Persons

- 690.4(E), 692.4(C), 694.7, 705.6 [qualified persons]
- The equipment and systems in 690.4(A) through (D) and all associated wiring and interconnections shall be installed only by qualified persons.
- Informational Note: See Article 100 for the definition of *qualified person.*

88

690.4(F) Circuit Routing

- Source and PV output conductors, in and out of conduit, and inside of a building or structure, shall be routed along building structural members.
- Where PV circuits imbedded in built-up, laminate, or membrane roofing locations not covered by PV modules and associated equipment, the location of circuits shall be clearly marked

92

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690.11 Arc-Fault Circuit Protection (Direct Current)

- Photovoltaic systems with dc source circuits, dc output circuits, or both, on or penetrating a building operating at a PV system maximum system voltage of 80 volts or greater, shall be protected by a listed (dc) arc-fault circuit interrupter, PV type, or other system components listed to provide equivalent protection.

94

Article 694

Small Wind Electric Systems

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Article 694 [New]

- This article applies to small wind electric systems (also known as small wind turbine systems)
- The new article includes associated equipment such as generators, alternators, inverter(s), and controller(s) for such systems.

97

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695.3(F) [New]

Phase Converters. Phase converters shall not be permitted to be used for fire pump service.

This revision aligns the NFPA 20 restriction against phase converters with Article 659 of the *NEC*.

98

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Chapter 7

Special Conditions

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700.10(D) Feeder Circuit Wiring

- Feeder-circuit wiring protection
- The minimum fire-resistance rating provided in (2), (3), and (4) has been increased from 1-hour to 2-hour.
- Consistency between the minimum fire-rating requirements in 695.6(B).

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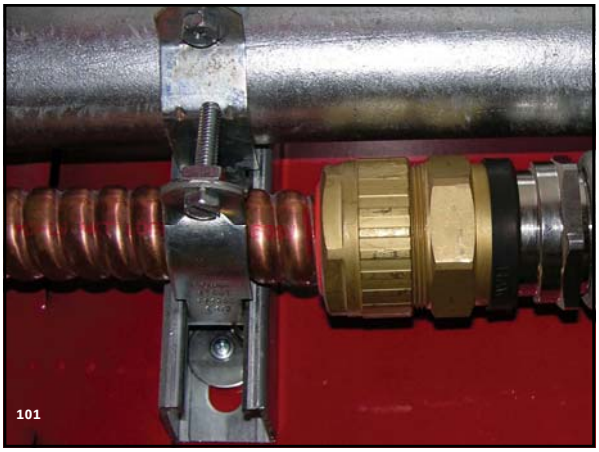

101

705.6 System Installation

- Installation of one or more electrical power production sources operating in parallel with primary sources of electricity shall be installed only by qualified persons.

102

Chapter 8

Communications Systems

104

Article 800 Informational Note

- The term grounding conductor has been replaced by either the term *grounding electrode conductor* or *bonding conductor*.
- Two new figures show the conductors of grounding and bonding systems for communications systems installations.

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800.100(A)(1) [Revision]

The grounding conductor shall be listed and shall be permitted to be insulated, covered, or bare.

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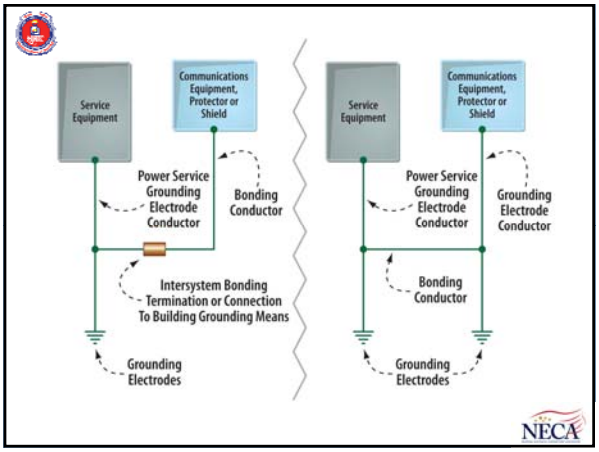

108

Summary

- The *NEC* is an integral component of the electrical contracting business.
- Staying ahead of the curve results in competitive advantages and avoids unanticipated surprises (costs).
- Leaders in the electrical contracting business understand the value of *NEC* knowledge.

110

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