Electrical Licensing and Inspection
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St. Paul, Minnesota 55155-4342
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Residential Electrical Inspection

Checklist

Generally, **Minnesota law** requires all electrical work to be performed by licensed, bonded and insured electrical contractors and their employees.

Homeowners, within strict limitations, are exempt from electrical licensing.

*An **owner** is a natural person who physically performs electrical work on premises the person owns and actually occupies as a residence or owns and will occupy as a residence upon completion of construction.*
Minnesota Statutes 326.01, Subd. 6e

A separate request for electrical inspection form with the required fees must be submitted to the Dept. of Labor and Industry at or before commencement of any electrical installation that is required by law to be inspected.

All wiring shall be inspected before it is concealed and the installer shall notify the inspector when the wiring is complete, before the wiring is utilized and the associated space occupied.

When an owner files a Request for Electrical Inspection form and inspection fees with the Dept. of Labor and Industry or other electrical inspection authority, that person is signing an affidavit that they own and occupy the residence and that they personally and physically will perform all of the electrical work, including the laying out of such work.

It is illegal for an owner to install electrical wiring in mobile home or recreational vehicle parks, or on property that is rented, leased, or occupied by others.

A ROUGH-IN INSPECTION *must be made before insulation, sheet-rock, paneling, or other materials cover any wiring. Underground wiring must be inspected before the trench is back-filled. Except for the final connection to switches, receptacles, and lighting fixtures, all ground wires and other wires in boxes must be spliced and pigtailed for the rough-in inspection.*

STATE ELECTRICAL INSPECTORS ARE AVAILABLE WEEKDAYS ONLY
Between 7:00 am and 8:30 am

Document EBHO20050701

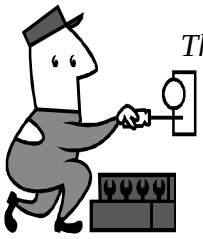
01 Where wiring is concealed before inspection, the person responsible for concealing the wiring shall be responsible for all costs resulting from uncovering and replacing the covering material.

Minnesota Rules part 3800.3770

02 **The installer shall schedule a final inspection** when the electrical work is completed prior to the wiring being utilized and the space occupied.

Minnesota Rules 3800.3780

PLAN YOUR WIRING PROJECT



This brochure is intended to be a general overview of residential electrical requirements. No claim is made that this information is complete or beyond question.

Additional information and knowledge is needed to properly install electrical wiring that is essentially free from fire and electric shock hazard.

For assistance, please reference authoritative publications based on the 2005 National Electrical Code © (the NEC).

General Circuitry

03 **NEC 210.11** and **422.12** In addition to the branch circuits installed to supply general illumination and receptacle outlets in dwelling units, the following minimum requirements apply:

- Two 20-amp circuits for the kitchen receptacles
- One 20-amp circuit for the laundry receptacles
- One 20-amp circuit for the bathroom receptacles
- One separate, individual branch circuit for central heating equipment

04 **NEC 210.52** Receptacles installed in the kitchen to serve countertop surfaces shall be supplied by not less than two separate small appliance branch circuits.

05 **NEC 300.3** All conductors of the same circuit, including grounding and bonding conductors, shall be contained in the same raceway, cable, or trench.

06 **NEC 408.4** Every circuit and circuit modification shall be legibly identified as to its clear, evident and specific purpose or use in sufficient detail on a directory located on the face or inside of the electrical panel doors.

07 **NEC 240.3** Generally, the rating of the fuse or circuit breaker determines the minimum size of the circuit conductor, per the following table:

Fuse or Circuit Breaker Size	Minimum Wire Size	
	Copper Conductor	Aluminum Conductor
15 amp	14	n/a
20 amp	12	n/a
30 amp	10	8
40 amp	8	6
50 amp	6	4

Note: Conductors that supply motors, air-conditioning units, and other special equipment may have overcurrent protection that exceeds the general limitations in the above chart.

08 **NEC 406.3** Receptacle outlets shall be of the grounding type, be effectively grounded, and have proper polarity.

09 **NEC 210.52** Generally, receptacle outlets in habitable rooms shall be installed so that no point measured horizontally along the floor line in any wall space is more than 6‘ from a receptacle outlet. A receptacle shall be installed in each wall space 2 feet or more in width.

10 **NEC 210.52** At kitchen countertops, receptacle outlets shall be installed so that no point along the wall line is more than 24 inch measured horizontally from a receptacle outlet in that space. Countertop spaces separated by range tops, sinks or refrigerators are separate spaces.

11 **NEC 210.52** A receptacle outlet shall be installed at each counter space 12 inch or wider, and at each island counter or peninsular space 24 inch by 12 inch or greater. Receptacles shall be located not more than 20 inch above the countertop, or where mounted below a countertop less than 6 inches beyond the support base, not more than 12 inch below the countertop.

12 **NEC 210.52 & 406.8** At least one receptacle, accessible at grade level and no more than 6.5' above grade, shall be installed at the front and back of a dwelling and shall have covers that are weatherproof whether or not an attachment plug is inserted.

13 **NEC 210.12** All branch circuits supplying 125-volt, 15 and 20 ampere outlets in dwelling unit bedrooms shall be protected by a listed arc-fault circuit interrupter device.

Ground-Fault Protection

14 **NEC 210.8** Ground-fault circuit-interrupter (GFCI) protection shall be provided for all 125-volt, 15 and 20 amp receptacle outlets installed outdoors, in boathouses, garages, unfinished accessory buildings, crawl spaces at or below grade level, unfinished basements, bathrooms, at kitchen countertops and within 6’ of the outside edge of the sink in laundry rooms, utility rooms, and at wet-bars.

15 **NEC 680.71** A hydro-massage bathtub, (a bathtub with a re-circulating piping system, designed to discharge water upon each use) and its associated components shall have ground-fault circuit-interrupter protection.

16 **NEC 680.71** All 125-volt receptacles not exceeding 30 amperes installed within 5 feet of the inside walls of a hydromassage bathtub shall be GFCI protected.

17 **NEC 680.73** Hydromassage bathtub equipment shall be accessible without damaging the building structure or finish.

18 **NEC 682.33** All circuits rated not more than 60 amps at 120 through 250-volts installed outdoors for equipment in or adjacent to natural and artificial bodies of water shall have GFCI protection.

The NEC requires an equipotential bonding grid be installed at outdoor pools, spas, hot tubs, livestock areas, and for electrical equipment at natural and artificially made bodies of water.

Wiring Methods

19 **NEC 314.23** All electrical boxes shall be rigidly secured to the building structure.

20 **NEC 314.27** Boxes used as the sole support for a ceiling-suspended paddle fan shall be listed, marked, and not be used for fans weighing more than 70 lbs.

21 **NEC 334.30** Type NM (nonmetallic) cable shall be secured at intervals not exceeding 4.5' and within 12 inch of each box.

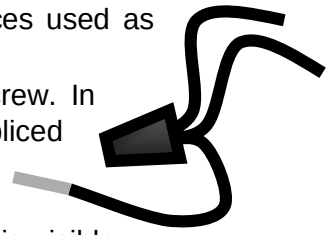
22 **NEC 314.17** The outer jacket of NM cable shall be secured to the box and extend into the box a minimum of ¼ inch.

23 **NEC 300.14** The minimum length of conductors, including grounding conductors, at all boxes shall be 6 inches with at least 3 inches extending outside the box.

24 **NEC 300.4** Where cables are installed through bored holes in joists, rafters, or wood framing members, the holes shall be bored so that the edge of the hole is not less than 1¼ inch from the nearest edge of the wood member. If this distance cannot be maintained, or where screws or nails are likely to penetrate the cable, it shall be protected by a steel plate at least 1/16 inch thick and of appropriate length and width.

NOTE: Check with local building codes to determine where holes or notches may be made in joists and supports.

25 **NEC 300.22** Type NM cable shall not be installed in spaces specifically fabricated for environmental air, but may pass perpendicular through joist or stud spaces used as such.



26 **NEC 110.14** Only one conductor shall be installed under a terminal screw. In boxes with more than one grounding wire, the grounding wires shall be spliced with a "wire tail" or "pigtail" which is then attached to the grounding terminal screw of the device.

27 **NEC 200.7(C)** Where permanently re-identified at each location where it is visible and accessible, the conductor in type NM cable with white colored insulation may be used as an ungrounded conductor.

28 **NEC 250.134; 314.4; 404.9** All electrical equipment, metal boxes, cover plates, and plaster rings shall be grounded. All switches, including dimmer switches, shall be grounded.

29 **NEC 110.12 & 314.17** Unused openings in boxes shall be effectively closed. If openings in non-metallic boxes are broken out and not used, the entire box must be replaced.

30 **NEC 408.41** Each grounded conductor shall terminate within a panelboard in an individual terminal that is not used for any other conductor.

31 **NEC 110.14** Splices shall be made with an approved splice cap or "wire nut" and shall be made in approved electrical boxes or enclosures.

32 **NEC 314.25 & 410.12** In completed installations, each box shall have a lamp-holder, canopy or device with an appropriate cover plate.

33 **NEC 314.19** Junction boxes shall be installed so that the wiring contained in them can be rendered accessible without removing any part of the building.

34 **NEC 314.16** The volume of electrical boxes shall be sufficient for the number of conductors, devices, and cable clamps contained within the box. Nonmetallic boxes are marked with their cubic inch capacity. Use the following table to calculate each box size:

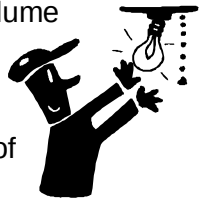
Conductor Size	**14 AWG**	**12 AWG**
Each separate insulated wire	2 in^3	2.25 in^3
All ground wires (combined)	2 in^3	2.25 in^3
For each device (switch/receptacle)	4 in^3	4.4 in^3
All internal cable clamps (combined)	2 in^3	2.25 in^3

Sample Calculation: Four 14/2 w/ground type NMB cables:

8 insulated wires	16 cubic inches
All ground wires	2 cubic inches
1 switch	4 cubic inches
1 receptacle	4 cubic inches
All clamps (combined)	2 cubic inches
Total box volume required	**28 cubic inches**

35 **NEC 410.8** Luminaires (lighting fixtures) installed in clothes closets shall have the following minimum clearances from the defined storage area (see below):

- 12inch for surface incandescent fixtures
- 6inch for recessed incandescent fixtures
- 6inch for fluorescent fixtures



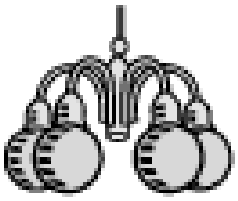
36 **NEC 410.8** Storage space, as applied to an electrical installation in a closet, is the volume bounded by the sides and back closet walls and planes extending from the closet floor vertically to a height of 6' or the highest clothes-hanging rod and parallel to the walls at a horizontal distance of 24inch from the sides and back of the closet walls respectively, and continuing vertically to the closet ceiling parallel to the walls at a horizontal distance of 12inch or the shelf width, whichever is greater.

37 **NEC 410.8** Incandescent luminaires with open or partially enclosed lamps and pendant fixtures or lamp-holders are not permitted in clothes closets.

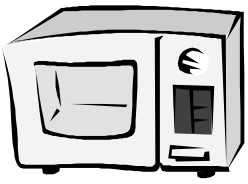
38 **NEC 410-66** Recessed lighting fixtures installed in insulated ceilings or installed within 1/2inch of combustible material shall be approved for insulation contact and labeled Type IC.

The Minnesota Energy Code Chapter 7676 requires that all penetrations installed through an interior air barrier be sealed prior to covering or making inaccessible so that a continuous interior air barrier is maintained. Sealing for wires and equipment must include the service entrance, wires, conduit, cables, panels, recessed light fixtures, electronic equipment, heating appliances, electrical boxes, and fan housings.

Equipment Listing and Labeling



39 **Minnesota Rules 3800.3620** All electrical equipment, including luminaires, devices, and appliances used as part of or in connection with an electrical installation shall be LISTED AND LABELED by a Nationally Recognized Testing Laboratory (NRTL) as having been tested and found suitable for a specific purpose.



40 **NEC 110.3** All electrical equipment shall be installed and used in accordance with the listing requirements and manufacturer's instructions.

Electrical Services

41 **NEC 310-15 CONDUCTOR SIZES FOR 120/240 VOLT 3-WIRE, SINGLE-PHASE, DWELLING SERVICES AND FEEDERS**

Copper	Aluminum	Service Rating
4 AWG	2 AWG	100 amps
1 AWG	2/0	150 amps
2/0	4/0	200 amps

42 **NEC 110.14** Listed anti-oxidant compound shall be used on all aluminum conductor terminations, unless information specifically states that it is not required.

43 **NEC 300.7** Portions of raceways or sleeves subject to different temperatures (i.e. passing from the interior to the exterior of a building) shall be sealed with an approved material to prevent condensation from entering equipment.

44 **NEC 230.54** Service entrance conductors shall be rain-tight and arranged to drain.

45 **NEC 300.4** Where raceways containing ungrounded conductors No. 4 or larger enter a cabinet, box, or enclosure, the conductors shall be protected by a bushing providing a smoothly rounded insulating surface.

46 **NEC 230.70** The service disconnecting means shall be installed at a readily accessible location either outside a building or structure or inside nearest the point of entrance of the service-entrance conductors.

47 **NEC 230.70 & 240.24** Electrical panels shall be readily accessible and shall not be located in bathrooms or in the vicinity of easily ignitable materials such as clothes closets.

48 **NEC 408.36** Plug-in type overcurrent devices that are back-fed shall be secured by an additional approved device.

49 **NEC 110.26** Sufficient working space shall be provided around electrical equipment. The depth of that space in the direction of access to live parts shall be a minimum of 3 feet. The minimum width of that space in front of electrical equipment shall be the width of the equipment or 30 inches whichever is greater. This workspace shall be clear and extend from the floor to a height of 6.5'. This space shall not be used for storage.

50 **NEC 110.26** Illumination shall be provided for all working spaces about service equipment and panelboards.

Grounding

51 **NEC 250.50** All grounding electrodes that are present at each building or structure served shall be bonded together to form the grounding electrode system.

52 **NEC 250.50** Permitted electrodes include: 1. Metal underground water pipe in direct contact with earth for 10 feet or more 2. Metal frame of the building or structure 3. Concrete encased electrodes 4. Ground ring 5. Rod or pipe electrode 6. Plate electrode 7. Other metal underground systems or structures.

53 **NEC 250.53** A metal underground water pipe shall be supplemented by an additional electrode.

54 **NEC 250.64** The grounding electrode conductor shall be continuous, securely fastened and protected from physical damage.

55 **NEC 250.66** The size of the grounding electrode conductor shall be determined by the size of the service-entrance conductors, per the following chart:

Equivalent Size of Service Entrance Conductor		**Size of the Grounding Electrode Conductor**	
Copper	Aluminum	Copper	Aluminum
4 AWG	2	8*	6
1 AWG	2/0	6	4
2/0 or 3/0	4/0 or 250	4	2

*The conductor that is the sole connection to a rod, pipe or plate electrode is not required to be larger than #6 AWG copper, however smaller conductors require physical protection.

*The conductor that is the sole connection to a concrete encased electrode shall not be required to be larger than #4 AWG copper.

56 **NEC 250.28** A main bonding jumper or the green bonding screw provided by the panel manufacturer shall be installed in the service panel.

57 **NEC 250.104** The interior metal water piping and other metal piping that may become energized shall be bonded to the service equipment with a bonding jumper sized the same as the grounding electrode conductor.

Underground Wiring

58 **NEC 300.5** Direct buried cable or conduit or other raceways shall meet the following minimum cover requirements:

Direct Burial Cable	Rigid or Intermediate Metal Conduit	Non Metallic Raceway (PVC)
24"	6"	18"
Residential branch circuits rated 20 amps or less at 120 volts or less and with GFCI protection at their source are allowed a minimum cover of 12"		

NOTE: This table does not apply to underground wiring for outdoor pools, spas, or hot tubs - see NEC Article 680

59 **NEC 300.5** Underground service laterals shall have their location identified by a warning ribbon placed in the trench at least 12" above the underground installation.

60 **NEC 300.5** Where subject to movement, direct buried cables or raceways shall be arranged to prevent damage to the enclosed conductors or connected equipment.

61 **NEC 110.14** Wire splicing means for direct burial conductors shall be listed for such use.

62 **NEC 300.5** Conductors emerging from underground shall be installed in rigid metal conduit, intermediate metal conduit, or Schedule 80 rigid nonmetallic conduit from 18” below grade or the minimum cover distance to the point of termination above ground.

Electrical Inspection Fees

These fees apply generally. Fees for other specific types of installations apply as identified in Minnesota Statutes 326.2441

The inspection fee for the installation, addition, alteration, or repair to a service, change of service, temporary service, generator or other power supply source or feeder shall be per the chart below.

Each Service, Generator or Other Source of Supply	
0 to and including 400 amps @ $25	
401 to 800 amps @ $50	

The inspection fee for the installation, addition, alteration, or repair of each circuit or feeder, feeder tap, or set of transformer secondary conductors including the equipment served, shall be per the chart below:

Each Circuit or Feeder	
0 to and including 200 amps @ $5	
Over 200 amps @ $10	

The fee for each separate inspection of an installation, replacement, alteration, or repair is $20.
The TOTAL calculated fee cannot be less than $20 for each required inspection trip.

ONE & TWO FAMILY DWELLINGS, EACH UNIT Includes the Service / Power Supply up to 500 Amperes, Ten or More Circuits, and Two Inspection Trips	
Each Dwelling Unit @ $80	
Additional Inspection Trips @ $20	

- **Example 1:** For an installation involving one circuit and one inspection trip the electrical inspection fee is $20, the minimum fee.

For a project where more circuits or feeders rated less than 200 amps are involved, the fee is calculated by multiplying the number of circuits installed or altered by $5.

- **Example 2:** For a detached structure that involves the installation of a feeder to a separate building ($25) and 2 circuits ($10) requiring a rough-in inspection of the wiring to be concealed and a final inspection, the inspection fee is $40, the cost of two inspection trips.

- **Example 3**: For an installation that includes a 400 amp service and 42 circuits for a single family dwelling, the inspection fee is $80, which includes two inspection trips. Additonal inspections are $20.00.

Whenever a re-inspection is necessary to determine whether unsafe conditions have been corrected, a re-inspection fee of $20 may be assessed in writing by the inspector.

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