



## PLANNING AND DEVELOPMENT SERVICES

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# Homeowner Electrical Permit Guide

The Homeowner's Electrical Permit may only be issued to homeowners performing basic Electrical work without physical assistance from professionals or others. **They must be listed as the homeowner of record on the deed and live in the home to perform the work.**

A **Preliminary Conference is a mandatory inspection** that can help troubleshoot problems before you begin. Request the conference prior to beginning any work. After an approval to start has been received, begin electrical rough-in installation. Upon completion of rough-in installation, call to schedule a rough-in inspection prior to covering the system. Call to schedule a Final Inspection at 100% completion of electrical installation.

**To schedule a conference or inspection please go online ([permits.cityofboise.org](https://permits.cityofboise.org)) or call the Permit Desk at 208-608-7070.**

## MOST COMMON RESIDENTIAL WIRING TOPICS

### ABBREVIATIONS

**National Electrical Code:** NEC

**Ground Fault Circuit Interrupter:** GFCI

**Arc-Fault Circuit Interrupter:** AFCI

**Nonmetallic-Sheathed Cable:** NM Cable

**Rigid Polyvinyl Chloride Conduit:** PVC

**American Wire Gage:** AWG

### GENERAL CIRCUITRY

**NEC 590.6 - GFCI Protection for Temporary Power:** All receptacle outlets used for temporary power for construction shall have GFCI protection.

**NEC 110.3 - All Electrical Equipment Shall be Listed and Labeled** by a qualified electrical testing laboratory and shall be installed as per manufacturer's instructions.

**NEC 210.8 - GFCI Protection:** All receptacle outlets installed to serve the kitchen counter top areas or located within 6ft. from the inside edge of a basin or sink, bathrooms,

outdoors, garages, and receptacles located in crawl spaces, unfinished portions or areas of a basement not intended as habitable rooms, shall be GFCI protection.

**NEC 210.12 - AFCI Protection:** All new 120-volt, single phase, 15 or 20-amp branch circuits supplying outlets and devices installed in dwelling unit bedroom areas shall have AFCI protection. This includes receptacle outlets, switches, lights, and smoke detectors. AFCI receptacle shall be installed in a readily accessible location.

**NEC 210.52(A) - Receptacle Spacing:** Habitable room minimum electrical receptacle layout. Examples of habitable rooms are living room, family rooms, dens, dining rooms, nooks, and bedrooms. A receptacle outlet shall be located within 6' of an opening or break in wall, such as a door or fireplace. No location measured along floor line shall exceed 6' from a receptacle outlet. Any wall 24" or wider (including space measured around corners) shall have a receptacle outlet installed.

A fixed panel of a window or sliding door is considered wall space so a receptacle outlet may be required to be installed in the floor. Floor receptacles to qualify for wall space shall be installed within 18" of wall served. Receptacles installed to serve countertop and similar work surfaces as specified in 210.52(C) shall not be considered as the receptacle outlets required by 210.52(A).

**NEC 210.52(I) - Foyer Receptacle Spacing:** Foyer areas that are not a part of a hallway and are greater than 60 square foot shall have a receptacle outlet installed on each wall spaced 3' or wider. Doorways or door-side windows that extend to the floor and similar openings shall not be considered wall space.

**NEC 210.52(B) - Receptacle Spacing:** Receptacle outlets serving kitchen countertop and similar work surface. Any kitchen countertop 12" or wider shall have a receptacle outlet installed. While measuring along wall line, at no point shall there be more than 24" from a receptacle outlet. For example, from the edge of a wall or range a receptacle outlet shall be located within 24" of the wall or range, then from that receptacle the next receptacle outlet shall be located within 48" and so on until the next wall or break in counter top is reached. The last receptacle outlet shall be located within 24" of that point. The receptacle outlets shall be located above countertop but shall not be more than 20" above counter.

Island and peninsula countertop areas do require receptacle outlets depending on design. These receptacle outlets can be located below countertop area however shall not be more than 12" below and shall not be located more than 6" back under an overhang. Kitchen receptacle outlets serving countertop areas shall be supplied by a minimum of 2, 20-amp, 120-volt small appliance circuits. Kitchen small appliance circuit shall only serve receptacles located in kitchen, island, dining, nook, and pantry areas.

**NEC 210.23 - Permissible Loads:** Cord connected equipment, such as appliances not fastened in place, shall not exceed 80% of branch circuit rating. If equipment is fastened in place it shall not exceed 50% of the branch circuit rating. If these loads exceed these values, a dedicated circuit is required. Code does have a limit to how

many receptacle outlets may be installed on an individual branch circuit. However, an individual branch circuit shall not feed rooms larger than 600 square feet. Additional circuit would be needed.

**NEC 210.52(D) - Bathroom Receptacle Outlets:** At least one receptacle outlet shall be located within 36" of the outside edge of each basin or sink. The receptacle shall be located on a wall or partition adjacent to the basin or basin countertop. The receptacle can be located below, however not more than 12" below the top of basin, located on the countertop, or installed on the side or face of the basin cabinet.

**NEC 210.52(E)(1) - Outdoor Receptacle Outlets:** For a one-family dwelling and each unit of a two-family dwelling that is at grade level, (at least) one receptacle outlet shall be installed at the front and rear of dwelling. Each balcony, deck, or porch that is attached to the dwelling unit shall have a receptacle outlet installed. The receptacle shall be accessible from but not more than 6 1/2' above balcony, deck, or porch walking surface.

**NEC 210.52(F) - Receptacles in Laundry Areas:** Areas designed for laundry shall have at least 1 dedicated 20-amperes, 120-volt receptacle outlet installed for laundry equipment.

**NEC 210.52(G) - Receptacles in One-and Two-Family Dwelling Garages:** In one-and two-family dwellings garages with electrical power, shall have at least 1 receptacle outlet and 1 lighting outlet installed. A receptacle outlet shall be installed in each car bay. At least one 120-volt, 20-amp circuit shall be installed to feed receptacle outlets in attached or detached garages. This circuit shall have no other outlets apart from outdoor receptacles installed in a readily accessible location. Detached garages with not more than 2 circuits shall have a branch circuit disconnecting means not less than 30-amps (30-ampere 2 pole rated switch).

For all other installations, the branch circuit disconnecting rating shall not less than 60-amps. A means to disconnect, shall be provided for all-power from a detached structure or building. Detached buildings with three or more circuits shall have a grounding electrode system installed. A grounding electrode system is a concrete encased electrode or ground rods. A branch circuit or feeder to a detached building shall have an equipment grounding conductor if a second conductive path exists between structures.

**NEC 210.70 – Lighting Outlets Required:** All habitable rooms, including kitchens and bathrooms shall have at least 1 outlet (receptacle or Light) controlled by a wall switch installed for lighting. Additional locations include at least one wall-controlled lighting outlet shall be installed in hallways, stairways, attached garages and detached garages with electrical power. A switch shall be located at each floor level of a stairway with 6 or more steps. Each doorway, with access to outdoors, shall have a light fixture installed on the exterior, controlled by a wall switch by a door.

**NEC 406.12 - Tamper Resistant Receptacles:** All 15 and 20-amp, 125 and 250-volt non locking type receptacle outlets located below 5'6" installed in or on a dwelling unit shall be a listed tamper resistant type. Except when receptacles are a part of a luminaire or appliance, non-grounding receptacle used for replacement as permitted in NEC 406.4(D)(2)(a). Required Tamper Resistant Receptacles includes indoor, outdoor, and appliance garages. Outdoor receptacle outlets shall be the tampered and weather resistant type and have a hard service in-use cover.

**NEC 240.4(D) - Protection of Conductors:** Overcurrent devices shall not exceed 15-amps for #14 AWG (American Wire Gage), 20-amps for #12 AWG, 30-amps for #10 AWG, 40-amps for #8 AWG, 50-amps for #6 AWG copper NM cable.

**NEC 300.4 - Nail Plates:** NM cable when ran through bored holes that do not maintain 1 ¼" from edge of framing member shall be protected from physical damage by nail plates.

**NEC 300.14 - Free Wire Length:** The minimum free conductor length, including grounding conductors, at all boxes shall be 6". However, at least 3" of each conductor shall extend outside the box.

**NEC 300.22 - NM Cable Locations:** NM cables shall not be installed in spaces used for environmental air, cold air returns or heat ducts.

**NEC 314.17 - NM Cable:** The outer jacket of NM cable shall extend into the box and past a clamping device a minimum of ¼".

**NEC 314.23(B)(1) - Securing Electrical Boxes:** Nails and screws, where used as a fastening means, shall secure boxes by using brackets on the outside of the enclosure, or by using mounting holes in the back or in a single side of the enclosure, or they shall pass through the interior within 6 mm (1/4 in.) of the back or ends of the enclosure. Screws shall not be permitted to pass through the box unless exposed threads in the box are protected using approved means to avoid abrasion of conductor insulation. Mounting holes made in the field shall be approved.

**NEC 314.27 - Mounting Ceiling Fans:** When boxes are sole support for a ceiling paddle fan, they shall be listed and labeled for such use.

**NEC 300.22 - NM Cable Locations:** NM cables shall not be installed in spaces used for environmental air, cold air returns or heat ducts.

**NEC 250.134, 314.4, 404.9 - Required Grounding of Devices and Metal Boxes:** All electrical equipment, metal boxes, cover plates, plaster rings, switches and dimmers shall be grounded.

**NEC 110.12, 314.17 - All Unused Openings in Boxes Shall be Effectively Closed:** When openings in non-metallic boxes are broken out and not used, the entire box must be replaced.

**NEC 110.14 - Only One Conductor Shall be Installed Under a Terminal Screw:** In boxes with more than one ground wire, the ground wires shall be spliced with a pigtail and attached to the grounding terminal of the device.

**NEC 110.14 - Wiring Splices:** Splices must be made with an approved (or listed) wire cap or wire nut and shall be made in an approved enclosure or electrical box. Wire splicing used for a means for direct burial shall be identified for such use. Dissimilar metals shall not be intermixed in a terminal or splicing device. Listed anti-oxidant compound shall be used for aluminum conductor terminations.

**NEC 314.25, 410.22 - Incomplete Installations:** All outlet boxes shall have a cover, lamp-holder, canopy for a luminaire, or device with an appropriate cover plate.

**NEC 314.29 - J-Boxes Accessibly:** All Junction boxes shall be installed so that wiring installed in them can be rendered accessible without removing any part of the building.

**NEC 334.30 - Support and Secure of NM Cable:** NM cable shall have supports not exceeding 4 ½' and shall be secured within 12" of a box with a clamping connector, 8" without clamp exists. Flat cables shall not be stapled on edge.

**NEC 410.16 - Luminaire Clearances:** Luminaires or light fixtures installed in clothes closets shall have clearance from storage space. Insure a 12" for surface mount incandescent fixtures, 6" for recessed incandescent fixtures, 6" for fluorescent fixtures are present. These luminaires shall have totally enclosed lamps.

## ELECTRICAL SERVICES

**NEC 110.26 - Spaces About Electrical Equipment:** Access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment. When voltage to ground does not exceed 150-volts, the depth of that space in the direction of access to live parts, shall not be less than 3'. The minimum width of that space, in front of electrical equipment, shall be the width of the equipment or 30", whichever is greater. This workspace shall be clear and shall extend from floor to a height of 6 ½'. This space shall not be used for storage. All workspaces shall be provided with illumination.

**NEC 230.54 - Service Entrance Conductors:** Where exposed to weather, service entrance conductors shall be arranged so that water will not enter service raceway or equipment. A drip loop shall be installed.

**NEC 230.70 - Accessible Service Gear:** The electrical service disconnecting means shall be installed in a readily accessible location. Either outside a building or structure or inside nearest point of entrance of the service entrance conductors.

**NEC 230.70 - Service Panel Locations:** Electrical service panels shall be readily accessible, and shall not be installed in a bathroom, over the steps of a stairway or in the vicinity of easily ignitable materials such as clothes closets.

**NEC 240.24(A) - Accessibility; Location in or on Premises:** Switches containing fuses and circuit breakers shall be readily accessible and installed so that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, is not more than 2.0 m (6 ft 7 in.) above the floor or working platform.

**NEC 300.4(G) - Abrasion Protection:** Where raceways contain 4 AWG or larger insulated circuit conductors, and these conductors enter a cabinet, a box, an enclosure, or a raceway, the conductors shall be protected by an identified fitting providing a smoothly rounded insulating surface, unless the conductors are separated from the fitting or raceway by identified insulating material that is securely fastened in place.

**NEC 310.15 - Ampacities for Conductors:** Standard conductor sizes for service entrance conductors on residential services. #4 AWG copper or #2 AWG Aluminum for 100-amp, #1 AWG copper or #2/0 AWG aluminum for 150-amp, 2/0 AWG copper or 4/0 AWG Aluminum for 200-amp.

## GROUNDING

**NEC 250.28 - Bonding Jumper:** A main bonding jumper or green bonding screw provided by the panel manufacturer shall be installed in the service panel to electrically bond the grounded service conductor and the equipment grounding conductors to the enclosure.

**NEC 250.50 - Grounding Electrode System:** A premises electrical service shall be connected to any available grounding electrodes described in NEC 250.52 to form a grounding electrode system.

**NEC 250.52 - Grounding Electrodes:** Metal underground water pipe with 10' or more in contact with earth (including well casings), metal building frame, concrete encased electrode of #4 AWG copper conductor 20' long or 20' of ½" bare reinforcing bar within and near the bottom of a concrete footing, and 8' ground rods. An additional electrode must supplement the underground metal water pipe or a single rod.

**NEC 250.64(C) - Grounding Electrode Conductor Shall Not be Spliced:** Grounding electrode conductor(s) shall be installed in one continuous length without a splice or joint.

**NEC 250.66 - Table 250.66:** The size of the grounding electrode conductor is determined by the size of the service entrance conductors. For 100-amp conductors #8 copper or #6 aluminum, 150-amp conductors #6 copper or #4 aluminum, for 200-amp conductors #4 copper or #2 aluminum. The conductor that is sole connection for ground rods is not required to be larger than #6 AWG copper. For a concrete encased electrode, the grounding electrode conductor shall not be required to be larger than #4 AWG copper.

**NEC 250.104 - Metal Water Pipe Bond:** Interior metal water piping and other metal piping systems, that may become energized, shall be bonded to the service equipment with a bonding jumper sizes, the same as the grounding electrode conductor.

**NEC 250.134, 314.4, 404.9 - Required Grounding of Devices and Metal Boxes:** All electrical equipment, metal boxes, cover plates, plaster rings, switches and dimmers shall be grounded.

## UNDERGROUND WIRING

**NEC 300.5 - Direct Buried Cable or Conduit or Other Raceways:** Shall meet the following minimum cover requirements:

- A rigid or intermediate metal conduit shall be buried at a minimum 6".
- A non-metallic raceway (PVC) shall be buried at a minimum 18".
- A direct burial cable and approved individual conductors shall be buried at a minimum 24".
- An underground service laterals shall be buried at a minimum 30" and shall have their location identified by a warning ribbon placed at least 12" above the underground installation.

Where subject to movement, direct buried cables or conduit shall be arranged to prevent damage to the enclosed conductors and equipment. Conductors emerging from grade, shall be installed in rigid metal conduit, intermediate metal conduit, or schedule 80 PVC conduit to provide protection from physical damage and shall extend 18" below grade.