

BASIC GUIDELINES FOR COMPLIANCE WITH THE NATIONAL ELECTRIC CODE FOR RESIDENTIAL ELECTRICAL INSTALLATIONS (rev. 10/99)

This purpose of the National Electric Code is the practical safeguarding for persons and property from hazards arising from the use of electricity. This Code contains provisions considered necessary for safety. Compliance therewith and proper maintenance will result in an installation essentially free from hazard. The following specifications are excerpts from the National Electrical Code and recommendations to assist electricians in residential house wiring. This is not intended as an instruction manual for untrained persons, nor is it the code in its entirety. Persons performing electrical work are expected to know the code.

1. Electrical permits shall be obtained before any wiring is started, altered, repaired or replaced.
2. A double-pole circuit breaker shall protect split circuits.
3. Receptacles installed on 15 and 20 ampere branch circuits shall be of the grounding type. Grounding type receptacles shall be installed only on circuits of the voltage class and current for which they are rated. Receptacles and cord connectors having grounding contacts shall have those contacts effectively grounded by connection to the equipment grounding conductor of the circuit supplying the receptacle or cord connector. 210-7
4. For residential occupancies all 120 volts, single-phase 15 and 20-ampere receptacle outlets installed outdoors and in bathrooms, garages, and all in basement, shall have ground-fault-circuit protection for personnel. Such ground-fault-circuit protection may be provided for other circuits, locations, and occupancies, and where used, will provide additional protection against line-to-ground shock hazard. 210-8
5. CONSTRUCTION SITES: All 120 volt single-phase 15 and 20 ampere receptacle outlets which are not a part of the permanent wiring of the building or structure, shall have ground-fault-circuit interrupters for personnel protection.
6. In every kitchen, family room, dining room, breakfast room, living room, parlor, library, den, sunroom, bedroom, recreation room, or similar rooms, receptacle outlets shall be installed so that no point along the floor line, in any wall space is more than six feet, measured horizontally, from an outlet in that space, including any wall space two feet or more in width and the wall space occupied by sliding panels in exterior walls. The wall space afforded by fixed room dividers, such as freestanding bar type counters, railing etc., shall be included in the six-foot measurements. 210-52
7. In basements and garages where receptacles must normally be GFCI protected dedicated non-GFCI receptacles must be single type not duplex. (Freezers, sump pump, etc.)
8. In kitchen and dining area, a receptacle outlet shall be installed at each counter space 12 inches or wider; GFCI protection is required for all counter top receptacles in the kitchen. Counter top spaces separated by range tops, refrigerators, or sinks, shall be considered as separate counter top spaces. Receptacles rendered inaccessible by the installation of stationary appliances shall not be considered as these required outlets. Receptacles installed for counter tops shall be such that at any point along the countertop there is a receptacle within two feet or not more than four feet apart.
9. Receptacle outlets shall, insofar as practicable, be spaced equal distance apart. Receptacle outlets in floors shall not be counted as part of the required number of receptacle outlets unless located close to the wall.
10. At least one wall receptacle shall be installed in the bathroom adjacent to each basin location. This requirement prevails also for half-baths. Medicine cabinet and bar light receptacles if electrified shall be GFCI protected.

11. For a one family dwelling, at least one receptacle rear and front shall be installed out-of-doors. At least one receptacle outlet shall be installed in each basement and attached garage, all GFCI protected. Outlets in other sections of the dwelling for special appliances, such as laundry equipment, shall be placed within six feet of the intended location for the laundry. The six-foot rule applies, measured from floor opening (frame). 210-50

12. As used in this section, a "wall space" shall be considered a wall unbroken along the floor line by doorways, fireplaces, and similar openings. Each wall space two or more feet wide shall be treated individually and separately from other wall spaces within a room. A wall space shall be permitted to include two or more walls within a room (around corners where unbroken at the floor line). 210-52

13. The receptacle outlets required by this section shall be in addition to any receptacle that is part of any lighting fixture or appliance, located within cabinets, or cupboards, or located over 5 ½ feet above the floor . 210-52

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14. Lighting outlets shall be installed where specified below:

Dwelling Type Occupancies: At least one wall switch controlled lighting outlet shall be installed in every habitable room, in hallways, stairways, and attached garages and at all outdoor entrances. At least one lighting outlet, switched at the entrance, shall be installed in an attic, underfloor space, utility room, and basement where used for storage or containing equipment requiring servicing.

EXCEPTION #1: In habitable rooms, other than kitchens or bathrooms one or more receptacles controlled by a wall switch shall be permitted in lieu of lighting outlets.

EXCEPTION #2: In hallways, stairways, and at outdoor entrances remote, central, or automatic control of lighting shall be permitted. 210-70

15. Two or more 20-ampere small appliance branch circuits shall be provided for all receptacle outlets for the small appliance loads, including refrigeration equipment in the kitchen and breakfast room of the dwelling occupancies. Such circuits whether two or more are used shall have no other outlets. Staggering of appliance receptacles is recommended. Separate circuits for microwave ovens, large frost-free refrigerators and other high draw appliances shall be considered.

16. Where a feeder supplies branch circuits in which grounding conductors are required the feeder shall include or provide a grounding means to which the grounding conductors of the branch circuits shall be connected. Four wires or three wires and metal conduit. 215-6

17. An equipment-bonding jumper shall be used to connect the grounding terminal of a grounding type receptacle to a grounded box. 250-148

18. Where subject to physical damage, conductors shall be adequately protected. Cables through wood framing members: (1) Bored holes: In both exposed and concealed locations, where a cable or raceway type wiring method is installed through bored holes in joists, rafters, or similar structural wood member, holes shall be bored at a minimum of 2" from bottom. DO NOT DRILL TRUSSES. 300-4

19. Holes in studs for cable type wiring methods shall be bored at the approximate center of the face of the member but not less than one and one-quarter inches from the nearest edge or shall be protected from nails and screws by either a steel plate or bushing at least 1-16" thick and of appropriate length and width installed to cover the area through which nails or screws might penetrate the installed cable. (2) Notches in wood. Where there is no objection because of weakening the building structure, in both exposed and concealed locations, cables shall be permitted to be laid in notches in wood studs, joists, rafter, or other wood members where the cable at those points is protected against nails or screws by a steel plate at least 1-16" thick installed before the building finish is applied. 300-4

20. Cables in drilled holes treat as conduit. 40% Fill.

21. Bundling of NM cables is permitted only in case the panel is located between two studs and after all knockouts at the top and at the bottom are used up.

22. In multiwire (split) circuits the continuity of an identified-grounded conductor shall not depend upon device connections, such as lamp holders, receptacles, etc. Where the removal of such device would interrupt the continuity. 300-13 (pigtail wires before attaching device)

23. Conductors shall be continuous between outlets, devices, etc., and there shall be no splice or tap within a raceway itself. All junction boxes shall remain accessible. 300-13

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24. At least 6” of free conductor shall be left at each outlet and switch point for splices of the connection of fixtures or devices. 300-14

25. Direct buried cable or conduit or other raceways approved for the purposes shall be installed to meet the minimum cover requirements of Table 300-5.

TABLE 300-5 (See NEC for entire table)

MINIMUM COVER REQUIREMENTS 0 to 600 VOLTS

(Cover is defined as the distance between the top surface of direct buried cable, conduit, or other Raceways approved for the purpose of duct and the finish grade.)

WIRING METHOD MINIMUM BURIAL (Inches)

Direct buried cable.....	24
Ridge metallic conduit... ..	6
Ridge non-metallic conduit approved for direct burial without concrete encasement.....	18
Other approved raceways.....	18

a. UNDERGROUND CABLES UNDER BUILDINGS: Underground cable installed under a building shall be in a raceway that is extended beyond the outside walls of the building.

b. PROTECTION FROM DAMAGE: Conductors emerging from the ground shall be enclosed in enclosures or raceways approved for the purpose. Raceways installed on poles shall be of rigid metal conduit, PVC Schedule 80 or equivalent. The enclosures or raceways shall extend from below the ground line up to a point eight feet above finish grade. Conductors entering a building shall be protected by an approved enclosure or an approved enclosure or raceway from the ground line to the point of entrance shall protect raceway entering a building.

c. SPLICES AND TAPS: Underground cables in trenches shall be permitted to be spliced or tapped without the use of splice boxes. The splices or taps shall be made by methods and with material approved for the purpose.

d. BACKFILL: Backfill containing large rock, paving materials, cinders, large or sharply angular substances, or corrosive material, shall not be placed in an excavation where materials may damage ducts, cables, or other substructures or prevent adequate compaction of fill or contribute to corrosion of ducts, cables, or other substructures.

e. RACEWAY SEALS: Conduits or raceways through which moisture may contact energized live parts shall be sealed or plugged at either or both ends.

f. BUSHING: A Bushing shall be used at the end of a conduit, which terminates underground where cables leave the conduit as a direct burial wiring method. A seal incorporating the physical protection characteristics of a bushing shall be permitted to be used in lieu of a bushing.

g. SINGLE CONDUCTORS: All conductors of the same circuit including the grounding conductor where required shall be installed in the same raceway or shall be installed in close proximity in the same trench.

26. A box or fitting shall be installed at each conductor splice connection point, outlet, switch point, junction point, or pull point for the connection of conduit, electrical metallic tubing, surface raceway, or other raceways, and shall remain accessible after building finish is applied. 300-15

27. The equipment-grounding conductor must be run within the same raceway, cable, or cord or otherwise run with circuit conductors the entire length of the circuit run. 250-134B

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28. THE SIMPLIFIED FORMULA TO FIGURE THE SIZE OF THE OUTLET BOXES

- All grounding conductors = one unit total**
- All other individual conductors = one unit each**
- All clamps in boxes = one unit total**
- Each device (receptacle or switch) = two units each**

MULTIPLY NUMBER OF UNITS BY VOLUME AND YOU WILL ARRIVE AT THE PROPER SIZE OUTLET BOX.

VOLUME PER UNIT #12 CONDUCTOR IS 2.25 CUBIC INCHES

- 29.** In residential construction outlet boxes shall be mounted and wiring completed (less device), all splices must be twisted and crimped or wirenutted. Loadcenters shall be mounted and cables pulled in. The wiring of the loadcenter may be completed later.
- 30.** Name and phone number of installer and date shall be affixed to loadcenter.
- 31.** Above conditions must be met before rough-in inspection will be approved. Loadcenters mounted on boards shall be furred from masonry and provide $\frac{3}{4}$ " air space.
- 32.** Electric panels shall not be installed in stairways and/or closets-in basements a panel shall not be mounted within three feet-horizontally of a sumphole.
- 33.** Panels shall be adequately illuminated and readily accessible. 110-26 (30" wide – 3' in front – floor to ceiling) Disconnects for outdoor air conditioning equipment shall comply with working clearances as noted.
- 34.** Open-type light fixtures (such as porcelain type sockets) in any clothes closets are not permissible. Check section of code for clearances for other types of fixtures. 410-8
- 35.** Outlet boxes shall not be installed in any air-handling ducts. 300-22
- 36.** All bathroom fixtures shall be grounded. GFCI protection as required.
- 37.** Final inspection of electrical installations shall be approved only when equipment, devices, and fixtures are installed, loadcenters completed and identified.
- 38.** The feeder from main to subloadcenter shall consist of three insulated conductors plus one grounding conductor. 300-3 B
- 39.** Sub-loadcenters require an approved grounding bar for all grounding conductors.
- 40.** All junction boxes shall be accessible. 370-29
- 41.** Grounding electrode conductors shall be #4 solid copper and continuous.
- 42.** Lighting circuits shall be limited to ten outlets or less if load warrants.
- 43.** Receptacle circuits shall have a maximum of six receptacles each. Appliance circuits shall have a maximum of four receptacles duplex each.
- 44.** Receptacle and lighting and other branch circuits shall be copper.

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- 45.** The following appliances shall be wired with #6 AWG copper: free standing range, double oven, self-cleaning. Range tops shall be wired with #8 AWG copper.
- 46.** Multiple (3-way) switching shall be installed from the main and side, (respectively) garage door entrances. Multiple switching is also required for all stairways of six risers or more including basement stairway. Walkthru (3-way) switching should be installed in halls and rooms where appropriate.
- 47.** Surface wiring on masonry walls shall be in conduit. The conduit drops shall have a bushing-connector for protection of cable.
- 48.** All metallic outlet and junction boxes shall be grounded. If non-metallic boxes are used, receptacles shall be grounded. Switches in bathrooms and in proximity of sinks shall be grounding type.
- 49.** Any wiring of equipment (furnace, hot water heater, water pump controls, septic system controls, etc.) shall be in conduit from wall and/or ceiling down.
- 50.** When required by authority-having jurisdiction, wiring diagrams shall be submitted for residential use. For other than residential use, wiring diagrams shall be submitted, showing computed load, feeder details and general wiring layout. 215-5
- 51.** Ceiling (paddle) fans shall be mounted on UL listed boxes "For fan support". Large heavy lighting fixtures shall be mounted on boxes capable of safely supporting the weight of the fixture.
- 52.** Interior metal water piping shall be bonded to the service equipment with a copper bonding jumper and the point of attachment to the piping shall remain accessible. Size jumper in accordance with Table 250-122.
- 53.** Temporary wiring whether for construction of other purposes shall comply with all the applicable provisions of Article 305 of the NEC.

Electricians must be licensed in Ashtabula County

Homeowners may do their own wiring

If electrical installation is not approved on the first inspection, the re-inspection fee of \$25.00 will be assessed.