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 wood stud and steel stud walls with ratings not exceeding 2 h. These walls have gypsum board 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 board 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 (DWTT). Conduit bodies certified for use with specific conduit body covers and conduit body covers certified for use with specific conduit body are covered under Conduit Bodies and Covers Certified for Use with Specified Equipment (QCKW).

Conduit bodies that have been investigated for a specific combination of conductors are marked, on the conduit body or on or within the unit container of the conduit body, with the maximum number and maximum size of the conductors for which they are intended. For other conductor sizes and combinations, the total cross-sectional area of the fill should not exceed the cross-sectional area of the conductors specified in the marking. The total cross-sectional area is determined using the following type of conductor:

a) Type THHN or T90 Nylon for a fitting for use with 1/2 or 3/4 (16 or 21) trade size conduit or tubing, and

b) Type XHHW or RW90 XLPE for a fitting for use with 1 - 4 (27 - 103) trade size tubing and for use with 1 - 6 (27 - 155) trade size conduit.

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 - “F”; 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 multicendar 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

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 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. Refer to WET AND DAMP LOCATIONS below for clarifying information on the suitability of concrete-tight floor boxes not intended to be exposed to weather that are installed in concrete slabs or masonry.

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."

Floor boxes designated as "concrete tight" installed in concrete slabs or masonry are not considered to be in wet locations when the following conditions are met:

1. a vapor barrier is installed between the earth and a concrete slab or masonry (i.e., the concrete slab or masonry is not in direct contact with the earth),
2. the floor box is protected from exposure to weather within a building as defined by the NEC, and
3. the concrete slab or masonry above the vapor barrier is not subject to saturation by water or other liquids.

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 (QOY-Z).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).
ARTICLE 100 DEFINITIONS

Accessible (as applied to wiring methods). Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.

Ampacity. The maximum current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating.

Approved. Acceptable to the authority having jurisdiction.

Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

Bonded (Bonding). Connected to establish electrical continuity and conductivity.

Bonding Conductor or Jumper. A reliable conductor to ensure the required electrical conductivity between metal parts required to be electrically connected.

Branch Circuit. The circuit conductors between the final over-current device protecting the circuit and the outlet(s).

Branch Circuit, Appliance. A branch circuit that supplies energy to one or more outlets to which appliances are to be connected and that has no permanently connected luminaires that are not a part of an appliance.

Branch Circuit, General-Purpose. A branch circuit that supplies two or more receptacles or outlets for lighting and appliances.

Conduit Body. A separate portion of a conduit or tubing system that provides access through a removable cover(s) to the interior of the system at a junction of two or more sections of the system or at a terminal point of the system.

Boxes such as FS and FD or larger cast or sheet metal boxes are not classified as conduit bodies.

Connector, Pressure (Solderless). A device that establishes a connection between two or more conductors or between one or more conductors and a terminal by means of mechanical pressure and without the use of solder.

Continuous Load. A load where the maximum current is expected to continue for 3 hours or more.

Device. A unit of an electrical system, other than a conductor, that carries or controls electric energy as its principal function.

Electric Sign. A fixed, stationary, or portable self-contained, electrically operated and/or electrically illuminated utilization equipment with words or symbols designed to convey information or attract attention.

Enclosed. Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting energized parts.

Equipment. A general term, including fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, an electrical installation.

Feeder. All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device.

Fitting. An accessory such as a locknut, bushing, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function.

Grounded (Grounding). Connected (connecting) to ground or to a conductive body that extends the ground connection.

Ground Conductor. A system or circuit conductor that is intentionally grounded.

Ground-Fault Circuit Interrupter (GFCI). A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device.

Grounding Conductor, Equipment (EGC). The conductive path(s) that provides a ground-fault current path and connects normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both.

Grounding Electrode. A conducting object through which a direct connection to earth is established.

Grounding Electrode Conductor. A conductor used to connect the system ground conductor or the equipment to a grounding electrode or to a point on the grounding electrode system.

Lighting Outlet. An outlet intended for the direct connection of a lampholder or luminaire.

Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

Informational Note: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.
Location, Damp. Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture.

Informational Note: Examples of such locations include 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, some barns, and some cold-storage warehouses.

Location, Dry. 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.

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

Luminaire. A complete lighting unit consisting of a light source such as a lamp or lamps, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light. A lampholder itself is not a luminaire.

Neutral Conductor. The conductor connected to the neutral point of a system that is intended to carry current under normal conditions.

Outlet. A point on the wiring system at which current is taken to supply utilization equipment.

Overcurrent. Any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short circuit, or ground fault.

Informational Note: A current in excess of rating may be accommodated by certain equipment and conductors for a given set of conditions. Therefore, the rules for overcurrent protection are specific for particular situations.

Overload. Operation of equipment in excess of normal, full-load rating, or of a conductor in excess of rated ampacity that, when it persists for a sufficient length of time, would cause damage or dangerous overheating. A fault, such as a short circuit or ground fault, is not an overload.

Panelboard. A single panel or group 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.

Photovoltaic (PV) System. The total components and subsystem that, in combination, convert solar energy into electric energy for connection to a utilization load.

Plenum. A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.

Power Outlet. An enclosed assembly that may include receptacles, circuit breakers, fuseholders, fused switches, buses, and watt-hour meter mounting means; intended to supply and control power to mobile homes, recreational vehicles, park trailers, or boats or to serve as a means for distributing power required to operate mobile or temporarily installed equipment.

Qualified Person. One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.

Informational Note: Refer to NFPA 70E-2012, Standard for Electrical Safety in the Workplace, for electrical safety training requirements.

Raceway. An enclosed channel designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this Code.

Informational Note: A raceway is identified within specific article definitions.

Raintight. Constructed or protected so that exposure to a beating rain will not result in the entrance of water under specified test conditions.

Receptacle. A contact device installed at the outlet for the connection of an attachment plug, or for the direct connection of electrical utilization equipment designed to mate with the corresponding contact device. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple receptacle is two or more contact devices on the same yoke.

Receptacle Outlet. An outlet where one or more receptacles are installed.

Switch, General-Use. A switch intended for use in general distribution and branch circuits. It is rated in amperes, and it is capable of interrupting its rated current at its rated voltage.

Switch, General-Use Snap. A form of general-use switch constructed so that it can be installed in device boxes or on box covers, or otherwise used in conjunction with wiring systems recognized by this Code.

Voltage (of a circuit). The greatest root-mean-square (rms) (effective) difference of potential between any two conductors of the circuit concerned.

Informational Note: Some systems, such as 3-phase 4-wire, single-phase 3-wire, and 3-wire direct current, may have various circuits of various voltages.

Voltage, Nominal. A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (e.g., 120/240 volts, 480Y/277 volts, 600 volts.)

Informational Note No. 1: The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

Informational Note No. 2: See ANSI C84.1-2011, Voltage Ratings for Electric Power Systems and Equipment (60 Hz).

Informational Note No. 3: Certain battery units may be considered to be rated at nominal 48 volts dc but may have a charging float voltage up to 58 volts. In dc applications, 60 volts is used to cover the entire range of float voltages.

Voltage to Ground. For grounded circuits, the voltage between the given conductor and that point or conductor of the circuit that is grounded; for ungrounded circuits, the greatest voltage between the given conductor and any other conductor of the circuit.

Wavertight. Constructed so that moisture will not enter the enclosure under specified test conditions.

Weatherproof. Constructed or protected so that exposure to the weather will not interfere with successful operation.

Informational Note: Rainproof, raintight, or watertight equipment can fulfill the requirements for weatherproof where varying weather conditions other than wetness, such as snow, ice, dust, or temperature extremes, are not a factor.
210.8 Ground-Fault Circuit-Interrupter Protection for Personnel. Ground-fault circuit-interrupter protection for personnel shall be provided as required in 210.8(A) through (E). The ground-fault circuit interrupter shall be installed in a readily accessible location.

Informational Note: See 215.9 for ground-fault circuit-interrupter protection for personnel on feeders.
Informational Note No. 2: See 422.5(A) for GFCI requirements for appliances.

(A) Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in 210.8(A)(1) through (10) shall have ground-fault circuit-interrupter protection for personnel.

(1) Bathrooms

(2) Garages, and also accessory buildings that have a floor located at or below grade level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use

(3) Outdoors
Exception to (3): Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

(4) Crawl spaces — at or below grade level

(5) Unfinished portions or areas of the basement not intended as habitable rooms

Exception to (5): A receptacle supplying only a permanently installed fire alarm or burglar alarm system shall not be required to have ground-fault circuit-interrupter protection.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Receptacles installed under the exception to 210.8(A)(5) shall not be considered as meeting the requirements of 210.52(G).

(6) Kitchens — where the receptacles are installed to serve the countertop surfaces

(7) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(8) Boathouses

(9) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

(10) Laundry areas

(B) Other Than Dwelling Units. All single-phase receptacles rated 150 volts to ground or less, 50 amperes or less and three-phase receptacles rated 150 volts to ground or less, 100 amperes or less installed in the following locations shall have ground-fault circuit-interrupter protection for personnel.

(1) Bathrooms

(2) Kitchens

(3) Roofops

Exception No. 1 to (3): Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

(4) Outdoors

Exception No. 1 to (3) and (4): Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2 to (4): In industrial establishments only, where the conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(3) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power is interrupted or having a design that is not compatible with GFCI protection.

(5) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

Exception No. 1 to (5): In industrial laboratories, receptacles used to supply equipment where removal of power would introduce a greater hazard shall be permitted to be installed without GFCI protection.

Exception No. 2 to (5): For receptacles located in patient bed locations of general care (Category 2) or critical care (Category 1) spaces of health care facilities other than those covered under 210.8(B)(1), GFCI protection shall not be required.

(6) Indoor wet locations

(7) Locker rooms with associated showering facilities

(8) Garages, service bays, and similar areas other than vehicle exhibition halls and showrooms

(9) Crawl spaces — at or below grade level

(10) Unfinished portions or areas of the basement not intended as habitable rooms

(C) Boat Hoists. GFCI protection shall be provided for outlets not exceeding 240 volts that supply boat hoists installed in dwelling unit locations.

(D) Kitchen Dishwasher Branch Circuit. GFCI protection shall be provided for outlets that supply dishwashers installed in dwelling unit locations.

(E) Crawl Space Lighting Outlets. GFCI protection shall be provided for lighting outlets not exceeding 120 volts installed in crawl spaces.

210.11 Branch Circuits Required
Branch circuits for lighting and for appliances, including motor-operated appliances, shall be provided to supply the loads calculated in accordance with 220.10. In addition, branch circuits shall be provided for specific loads not covered by 220.10 where required elsewhere in this Code and for dwelling unit loads as specified in 210.11(C).

(A) Number of Branch Circuits. The minimum number of branch circuits shall be determined from the total calculated load and the size or rating of the circuits used. In all installations, the number of circuits shall be sufficient to supply the load served. In no case shall the load on any circuit exceed the maximum specified by 220.18.

(B) Load Evenly Proportioned Among Branch Circuits. Where the load is calculated on the basis of volt-amperes per square meter or per square foot, the wiring system up to and including the branch-circuit panelboard(s) shall be provided to serve not less than the calculated load. This load shall be evenly proportioned among multoutlet branch circuits within the panelboard(s). Branch-circuit overcurrent devices and circuits shall be required to be installed only to serve the connected load.

(C) Dwelling Units.

(1) Small-Appliance Branch Circuits. In addition to the number of branch circuits required by other parts of this section, two or more 20-ampere small-appliance branch circuits shall be provided for all receptacle outlets specified by 210.52(B).

(2) Laundry Branch Circuits. In addition to the number of branch circuits required by other parts of this section, at least one additional 20-ampere branch circuit shall be provided to supply the laundry receptacle outlet(s) required by 210.52(F). This circuit shall have no other outlets.

(3) Bathroom Branch Circuits. In addition to the number of branch circuits required by other parts of this section, at least one 120-volt, 20-ampere branch circuit shall be provided to supply the bathroom(s) receptacle outlet(s). Such circuits shall have no other outlets.
(4) Garage Branch Circuits. In addition to the number of branch circuits required by other parts of this section, at least one 120-volt, 20-ampere branch circuit shall be installed to supply receptacle outlets in attached garages and in detached garages with electric power. This circuit shall have no other outlets.

Exception: This circuit shall be permitted to supply readily accessible outdoor receptacle outlets.

210.12 Arc-Fault Circuit-Interruption Protection
Arc-fault circuit-interruption protection shall be provided as required in 120.12(A) (B), and (C). The arc-fault circuit interrupter shall be installed in a readily accessible location.

(A) Dwelling Units. All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in dwelling unit kitchens, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas, or similar rooms or areas shall be protected by any of the means described in 210.12(A), (1) through (6):

1. A listed combination-type arc-fault circuit interrupter, installed to provide protection of the entire branch circuit

2. A listed branch/feeder-type AFCI installed at the origin of the branch-circuit in combination with a listed outlet branch-circuit type arc-fault circuit interrupter installed at the first outlet box on the branch circuit. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit.

3. A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit type arc-fault circuit interrupter installed at the first outlet box on the branch circuit where all of the following conditions are met:

   a. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit arc-fault circuit interrupter.

   b. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

   c. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit.

4. A listed outlet branch-circuit type arc-fault circuit interrupter installed at the first outlet on the branch circuit in combination with a listed branch-circuit overcurrent protective device where all of the following conditions are met:

   a. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit arc-fault circuit interrupter.

   b. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

   c. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit.

   d. The combination of the branch-circuit overcurrent device and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and shall be listed as such.

(5) If RMC, IMC, EMT, Type MC, or steel- armored Type AC cables meeting the requirements of 250.118, metal wire-ways, metal auxiliary gutters, and metal outlet and junction boxes are installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a listed outlet branch-circuit type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

(6) Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a listed outlet branch-circuit type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

Exception: Where an individual branch circuit to a fire alarm system installed in accordance with 760.41(B) or 760.121(B) is installed in RMC, IMC, EMT, or steel-sheathed cable, Type AC or Type MC, meeting the requirements of 250.118, with metal outlet and junction boxes, AFCI protection shall be permitted to be omitted.

(B) Dormitory Units. All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets and devices installed in dormitory unit bedrooms, living rooms, hallways, closets, bathrooms, and similar rooms shall be protected by any of the means described in 210.12(A)(1) through (6).

(C) Guest Rooms and Guest Suites. All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets and devices installed in guest rooms and guest suites of hotels and motels shall be protected by any of the means described in 210.12(A)(1) through (6).

(D) Branch Circuit Extensions or Modifications — Dwelling Units and Dormitory Units. In any of the areas specified in 210.12(A) or (B), where branch-circuit wiring is modified, replaced, or extended, the branch circuit shall be protected by one of the following:

1. A listed combination-type AFCI located at the origin of the branch circuit

2. A listed outlet branch-circuit-type AFCI located at the first receptacle outlet of the existing branch circuit

Exception: AFCI protection shall not be required where the extension of the existing conductors is not more than 1.8 m (6 ft) and does not include any additional outlets or devices.
210.50 General
Receptacle outlets shall be installed as specified in 210.52 through 210.64.

Informational Note: See Informative Annex J for information regarding ADA accessibility design.

(A) Cord Pendants. A cord connector that is supplied by a permanently connected cord pendant shall be considered a receptacle outlet.

(B) Cord Connections. A receptacle outlet shall be installed wherever flexible cords with attachment plugs are used. Where flexible cords are permitted to be permanently connected, receptacles shall be permitted to be omitted for such cords.

(C) Appliance Receptacle Outlets. Appliance receptacle outlets installed in a dwelling unit for specific appliances, such as laundry equipment, shall be installed within 1.8 m (6 ft) of the intended location of the appliance.

210.52 Dwelling Unit Receptacle Outlets
This section provides requirements for 125-volt, 15- and 20-ampere receptacle outlets. The receptacles required by this section shall be in addition to any receptacle that is:

(1) Part of a luminaire or appliance, or
(2) Controlled by a wall switch in accordance with 210.70(A) (1), Exception No. 1, or
(3) Located within cabinets or cupboards, or
(4) Located more than 1.7 m (5½ ft) above the floor

Permanently installed electric baseboard heaters equipped with factory-installed receptacle outlets or outlets provided as a separate assembly by the manufacturer shall be permitted as the required outlet or outlets for the wall space utilized by such permanently installed heaters. Such receptacle outlets shall not be connected to the heater circuits.

Informational Note: Listed baseboard heaters include instructions that may not permit their installation below receptacle outlets.

(A) General Provisions. In every kitchen, family room, dining room, living room, parlor, library, den, sunroom, bedroom, recreation room, or similar room or area of dwelling units, receptacle outlets shall be installed in accordance with the general provisions specified in 210.52(A)(1) through (A)(4).

(1) Spacing. Receptacles shall be installed such that no point measured horizontally along the floor line of any wall space is more than 1.8 m (6 ft) from a receptacle outlet.

(2) Wall Space. As used in this section, a wall space shall include the following:

(1) Any space 600 mm (2 ft) or more in width (including space measured around corners) and unbroken along the floor line by doorways and similar openings, fireplaces, and fixed cabinets that do not have countertops or similar work surfaces

(2) The space occupied by fixed panels in walls, excluding sliding panels

(3) The space afforded by fixed room dividers, such as freestanding bar-type counters or railings

(3) Floor Receptacles. Receptacle outlets in or on floors shall not be counted as part of the required number of receptacle outlets unless located within 450 mm (18 in.) of the wall.

(4) Countertop and Similar Work Surface Receptacle Outlets. Receptacles installed for countertop and similar work surfaces as specified in 210.52(C) shall not be considered as the receptacle outlets required by 210.52(A).

(B) Small Appliances.

(1) Receptacle Outlets Served. In the kitchen, pantry, breakfast room, dining room, or similar area of a dwelling unit, the two or more 20-ampere small-appliance branch circuits required by 210.11(C)(1) shall serve all wall and floor receptacle outlets covered by 210.52(A), and receptacle outlets for refrigeration equipment.

Exception No. 1: In addition to the required receptacles specified by 210.52, switched receptacles supplied from a general-purpose branch circuit as defined in 210.70(A)(1), Exception No. 1, shall be permitted.

Exception No. 2: In addition to the required receptacles specified by 210.52, a receptacle outlet to serve a specific appliance shall be permitted to be supplied from an individual branch circuit rated 15 amperes or greater.

(2) No Other Outlets. The two or more small-appliance branch circuits specified in 210.52(B)(1) shall have no other outlets.

Exception No. 1: A receptacle installed solely for the electrical supply to and support of an electric clock in any of the rooms specified in 210.52(B)(1).

Exception No. 2: Receptacles installed to provide power for supplemental equipment and lighting on gas-fired ranges, ovens, or counter-mounted cooking units.

(3) Kitchen Receptacle Requirements. Receptacles installed in a kitchen to serve countertop surfaces shall be supplied by not fewer than two small-appliance branch circuits, either or both of which shall also be permitted to supply receptacle outlets in the same kitchen and in other rooms specified in 210.52(B)(1). Additional small-appliance branch circuits shall be permitted to supply receptacle outlets in the kitchen and other rooms specified in 210.52(B)(1). No small-appliance branch circuit shall serve more than one kitchen.

(C) Countertops and Work Surfaces. In kitchens, pantries, breakfast rooms, dining rooms, and similar areas of dwelling units, receptacle outlets for countertop and work surfaces shall be installed in accordance with 210.52(C)(1) through (C)(5).

(1) Wall Countertop and Work Surface. A receptacle outlet shall be installed at each wall countertop and work surface that is 300 mm (12 in.) or wider. Receptacle outlets shall be installed so that no point along the wall line is more than 600 mm (24 in.) measured horizontally from a receptacle outlet in that space.

Exception: Receptacle outlets shall not be required on a wall directly behind a range, counter-mounted cooking unit, or sink in the installation described in Figure 210.52(C)(1).

(2) Island Countertop Spaces. At least one receptacle shall be installed at each island countertop space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater.

(3) Peninsular Countertop Spaces. At least one receptacle outlet shall be installed at each peninsular countertop long dimension space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater. A peninsular countertop is measured from the connected perpendicular wall.
(4) **Separate Spaces.** Countertop spaces separated by rangetops, refrigerators, or sinks shall be considered as separate countertop spaces in applying the requirements of 210.52(C)(1). If a range, counter-mounted cooking unit, or sink is installed in an island or peninsula countertop and the depth of the countertop behind the range, counter-mounted cooking unit, or sink is less than 300 mm (12 in.), the range, counter-mounted cooking unit, or sink shall be considered to divide the countertop space into two separate countertop spaces. Each separate countertop space shall comply with the applicable requirements in 210.52(C).

(5) **Receptacle Outlet Location.** Receptacle outlets shall be located on or above, but not more than 500 mm (20 in.) above, the countertop or work surface. Receptacle outlet assemblies listed for use in countertops or work surfaces shall be permitted to be installed in countertops or work surfaces. Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, sinks, or rangetops as covered in 210.52(C)(1), Exception, or appliances occupying dedicated space shall not be considered as these required outlets.

Informational Note: See 406.5(E) and 406.5(G) for requirements for installation of receptacles in countertops and 406.5(F) and 406.5(G) for requirements for installation of receptacles in work surfaces.

Exception to (5): To comply with the following conditions (1) and (2), receptacle outlets shall be permitted to be mounted not more than 300 mm (12 in.) below the countertop or work surface. Receptacles mounted below a countertop or work surface in accordance with this exception shall not be located where the countertop or work surface extends more than 150 mm (6 in.) beyond its support base.

(1) Construction for the physically impaired
(2) On island and peninsula countertops or work surface where the surface is flat across its entire surface (no back-splashes, dividers, etc.) and there are no means to mount a receptacle within 500 mm (20 in.) above the countertop or work surface, such as an overhead cabinet

(D) **Bathrooms.** At least one receptacle outlet shall be installed in bathrooms within 900 mm (3 ft) of the outside edge of each basin. The receptacle outlet shall be located on a wall or partition that is adjacent to the basin or basin countertop, located on the countertop, or installed on the side or face of the basin cabinet. In no case shall the receptacle be located more than 300 mm (12 in.) below the top of the basin. Receptacle outlet assemblies listed for the application shall be permitted to be installed in the countertop.

Informational Note: See 406.5(E) for requirements for installation of receptacles in countertops.

(E) **Outdoor Outlets.** Outdoor receptacle outlets shall be installed in accordance with 210.52(E)(1) through (E)(3).

Informational Note: See 210.8(A)(3).

(1) **One-Family and Two-Family Dwellings.** For a one-family dwelling and each unit of a two-family dwelling that is at grade level, at least one receptacle outlet readily accessible from grade and not more than 2.0 m (6'12") above grade level shall be installed at the front and back of the dwelling.

(2) **Multifamily Dwellings.** For each dwelling unit of a multifamily dwelling where the dwelling unit is located at grade level and provided with individual exterior entrance/egress, at least one receptacle outlet readily accessible from grade and not more than 2.0 m (6'12") above grade level shall be installed.

(3) **Balconies, Decks, and Porches.** Balconies, decks, and porches that are attached to the dwelling unit and are accessible from inside the dwelling unit shall have at least one receptacle outlet accessible from the balcony, deck, or porch. The receptacle outlet shall not be located more than 2.0 m (6'12") above the balcony, deck, or porch walking surface.

(F) **Laundry Areas.** In dwelling units, at least one receptacle outlet shall be installed in areas designated for the installation of laundry equipment.

Exception No. 1: A receptacle for laundry equipment shall not be required in a dwelling unit of a multifamily building where laundry facilities are provided on the premises for use by all building occupants.

Exception No. 2: A receptacle for laundry equipment shall not be required in other than one-family dwellings where laundry facilities are not to be installed or permitted.

(G) **Basements, Garages, and Accessory Buildings.** For a one-family dwelling, at least one receptacle outlet shall be installed in the areas specified in 210.52(G)(1) through (3). These receptacles shall be in addition to receptacles required for specific equipment.

(1) **Garages.** In each attached garage and in each detached garage with electric power, at least one receptacle outlet shall be installed in each vehicle bay and not more than 1.7 m (5'12") above the floor.

(2) **Accessory Buildings.** In each accessory building with electric power.

(3) **Basements.** In each separate unfinished portion of a basement.

(H) **Hallways.** In dwelling units, hallways of 3.0 m (10 ft) or more in length shall have at least one receptacle outlet.

As used in this subsection, the hallway length shall be considered the length along the centerline of the hallway without passing through a doorway.

(I) **Foyers.** Foyers that are not part of a hallway in accordance with 210.52(H) and that have an area that is greater than 5.8 m² (60 ft²) shall have a receptacle(s) located in each wall space 900 mm (3 ft) or more in width. Doorways, door-side windows that extend to the floor, and similar openings shall not be considered wall space.

**ARTICLE 250 Grounding and Bonding**

250.4 **General Requirements for Grounding and Bonding.** The following general requirements identify what grounding and bonding of electrical systems are required to accomplish. The prescriptive methods contained in Article 250 shall be followed to comply with the performance requirements of this section.

(A) **Grounded Systems.**

(1) **Electrical System Grounding.** Electrical systems that are grounded shall be connected to earth in a manner that will limit the voltage imposed by lightning, line surges, or unintentional contact with higher-voltage lines and that will stabilize the voltage to earth during normal operation.

Informational Note No. 1: An important consideration for limiting the imposed voltage is the routing of bonding and grounding electrode conductors so that they are not any longer than necessary to complete the connection without disturbing the permanent parts of the installation and so that unnecessary bends and loops are avoided.

Informational Note No. 2: See NFPA 780-2014, Standard for the Installation of Lightning Protection Systems, for information on installation of grounding and bonding for lightning protection systems.

(2) **Grounding of Electrical Equipment.** Normally non–current-carrying conductive materials enclosing electrical conductors or equipment, or forming part of such equipment, shall be connected to earth so as to limit the voltage to ground on these materials.
(3) Bonding of Electrical Equipment. Normally non-current-carrying conductive materials enclosing electrical conductors or equipment, or forming part of such equipment, shall be connected together and to the electrical supply source in a manner that establishes an effective ground-fault current path.

(4) Bonding of Electrically Conductive Materials and Other Equipment. Normally non-current-carrying electrically conductive materials that are likely to become energized shall be connected together and to the electrical supply source in a manner that establishes an effective ground-fault current path.

(5) Effective Ground-Fault Current Path. Electrical equipment and wiring and other electrically conductive material likely to become energized shall be installed in a manner that creates a low-resistance path facilitating the operation of the overcurrent device or ground detector for high-impedance grounded systems. It shall be capable of safely carrying the maximum ground-fault current likely to be imposed on it from any point on the wiring system where a ground fault may occur to the electrical supply source. The earth shall not be considered as an effective ground-fault current path.

250.8 Connection of Grounding and Bonding Equipment

(A) Permitted Methods. Equipment grounding conductors, grounding electrode conductors, and bonding jumpers shall be connected by one or more of the following means:

(1) Listed pressure connectors
(2) Terminal bars
(3) Pressure connectors listed as grounding and bonding equipment
(4) Exothermic welding process
(5) Machine screw-type fasteners that engage not less than two threads or are secured with a nut
(6) Thread-forming machine screws that engage not less than two threads in the enclosure
(7) Connections that are part of a listed assembly
(8) Other listed means

(B) Methods Not Permitted. Connection devices or fittings that depend solely on solder shall not be used.

250.10 Protection of Ground Clamps and Fittings

Ground clamps or other fittings exposed to physical damage shall be enclosed in metal, wood, or equivalent protective covering.

250.12 Clean Surfaces

Nonconductive coatings (such as paint, lacquer, and enamel) on equipment to be grounded shall be removed from threads and other contact surfaces to ensure good electrical continuity or be connected by means of fittings designed so as to make such removal unnecessary.

Part V. Bonding

250.90 General

Bonding shall be provided where necessary to ensure electrical continuity and the capacity to conduct safely any fault current likely to be imposed.

250.92 Services

(A) Bonding of Equipment for Services. The normally non-current-carrying metal parts of equipment indicated in 250.92(A) (1) and (A)(2) shall be bonded together.

250.102 Grounded Conductor, Bonding Conductors, and Jumpers

(A) Material. Bonding jumpers shall be of copper, aluminum, copper-clad aluminum, or other corrosion-resistant material. A bonding jumper shall be a wire, bus, screw, or similar suitable conductor.

(B) Attachment. Bonding jumpers shall be attached in the manner specified by the applicable provisions of 250.8 for circuits and equipment and by 250.70 for grounding electrodes.

(C) Size — Supply-Side Bonding Jumper.

(1) Size for Supply Conductors in a Single Raceway or Cable. The supply-side bonding jumper shall not be smaller than specified in Table 250.102(C)(1).

(2) Size for Parallel Conductor Installations in Two or More Raceways or Cables. Where the ungrounded supply conductors are paralleled in two or more raceways or cables, and an individual supply-side bonding jumper is used for bonding these raceways or cables, the size of the supply-side bonding jumper for each raceway or cable shall be selected from Table 250.102(C)(1) based on the size of the ungrounded supply conductors in each raceway or cable. A single supply-side bonding jumper installed for bonding two or more raceways or cables shall be sized in accordance with 250.102(C)(1).

Informational Note: The term supply conductors includes ungrounded conductors that do not have overcurrent protection on their supply side and terminate at service equipment or the first disconnecting means of a separately derived system.

Informational Note No. 2: See Chapter 9, Table 8, for the circular mil area of conductors 18 AWG through 4/0 AWG.

(D) Size — Equipment Bonding Jumper on Load Side of an Overcurrent Device. The equipment bonding jumper on the load side of an overcurrent device(s) shall be sized in accordance with 250.122.
A single common continuous equipment bonding jumper shall be permitted to connect two or more raceways or cables if the bonding jumper is sized in accordance with 250.122 for the largest overcurrent device supplying circuits therein.

(E) Installation. Bonding jumpers or conductors and equipment bonding jumpers shall be permitted to be installed inside or outside of a raceway or an enclosure.

(1) Inside a Raceway or an Enclosure. If installed inside a raceway, equipment bonding jumpers and bonding jumpers or conductors shall comply with the requirements of 250.119 and 250.148.

(2) Outside a Raceway or an Enclosure. If installed on the outside, the length of the bonding jumper or conductor or equipment bonding jumper shall not exceed 1.8 m (6 ft) and shall be routed with the raceway or enclosure.

Exception: An equipment bonding jumper or supply-side bonding jumper longer than 1.8 m (6 ft) shall be permitted at outside pole locations for the purpose of bonding or grounding isolated sections of metal raceways or elbows installed in exposed risers of metal conduit or other metal raceway, and for bonding grounding electrodes, and shall not be required to be routed with a raceway or enclosure.

(3) Protection. Bonding jumpers or conductors and equipment bonding jumpers shall be installed in accordance with 250.64(A) and (B).

TABLE 250.122 Minimum Size Equipment Grounding Conductors for Grounding Raceway and Equipment

<table>
<thead>
<tr>
<th>Rating or Setting of Automatic Overcurrent Device in Circuit Ahead of Equipment, Conduit, etc., Not Exceeding (Amperes)</th>
<th>Size (AWG or kcmil)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Copper</td>
</tr>
<tr>
<td>15</td>
<td>14</td>
</tr>
<tr>
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<tr>
<td>5000</td>
<td>700</td>
</tr>
<tr>
<td>6000</td>
<td>800</td>
</tr>
</tbody>
</table>

Note: The metric designators and trade sizes are for identification purposes only and are not actual dimensions.

300.4 Protection Against Physical Damage
Where subject to physical damage, conductors, raceways, and cables shall be protected.

(A) Cables and Raceways Through Wood 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 wood members, holes shall be bored so that the edge of the hole is not less than 32 mm (1 1/4 in.) from the nearest edge of the wood member. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by screws or nails by a steel plate(s) or bushing(s), at least 1.6 mm (1/16 in.) thick, and of appropriate length and width installed to cover the area of the wiring.

Exception No. 1: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing.

Exception No. 2: A listed and marked steel plate less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

(2) Notches in Wood. Where there is no objection because of weakening the building structure, in both exposed and concealed locations, cables or raceways shall be permitted to be laid in notches in wood studs, joists, rafters, or other wood members where the cable or raceway at those points is protected against nails or screws by a steel plate at least 1.6 mm (1/16 in.) thick, and of appropriate length and width, installed to cover the area of the wiring. The steel plate shall be installed before the building finish is applied.

Exception No. 1: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing.

ARTICLE 250 General Requirements for Wiring Methods and Materials

Part I. General Requirements

300.1 Scope.
300.6 Protection Against Corrosion and Deterioration
Raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, elbows, couplings, fittings, supports, and support hardware shall be of materials suitable for the environment in which they are to be installed.

(A) Ferrous Metal Equipment. Ferrous metal raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, metal elbows, couplings, nipples, fittings, supports, and support hardware shall be suitably protected against corrosion inside and outside (except threads at joints) by a coating of approved corrosion-resistant material. Where corrosion protection is necessary and the conduit is threaded in the field, the threads shall be coated with an approved electrically conductive, corrosion-resistant compound.

Informational Note: Field-cut threads are those threads that are cut in conduit, elbows, or nipples anywhere other than at the factory where the product is listed.

Exception: Stainless steel shall not be required to have protective coatings.

(1) Protected from Corrosion Solely by Enamel. Where protected from corrosion solely by enamel, ferrous metal raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, metal elbows, couplings, nipples, fittings, supports, and support hardware shall not be used outdoors or in wet locations as described in 300.6(D).

(2) Organic Coatings on Boxes or Cabinets. Where boxes or cabinets have an approved system of organic coatings and are marked “Rainight,” “Rainproof,” or “Outdoor Type,” they shall be permitted outdoors.

(3) In Concrete or in Direct Contact with the Earth. Ferrous metal raceways, cable armor, boxes, cable sheathing, cabinets, elbows, couplings, nipples, fittings, supports, and support hardware shall be permitted to be installed in concrete or in direct contact with the earth, or in areas subject to severe corrosive influences where made of material approved for the condition, or where provided with corrosion protection approved for the condition.

300.10 Electrical Continuity of Metal Raceways and Enclosures
Metal raceways, cable armor, and other metal enclosures for conductors shall be metallically joined together into a continuous electrical conductor and shall be connected to all boxes, fittings, and cabinets so as to provide effective electrical continuity. Unless specifically permitted elsewhere in this Code, raceways and cable assemblies shall be mechanically secured to boxes, fittings, cabinets, and other enclosures.

Exception No. 1: Short sections of raceways used to provide support or protection of cable assemblies from physical damage shall not be required to be made electrically continuous.

Exception No. 2: Equipment enclosures to be isolated, as permitted by 250.96(B), shall not be required to be metallically joined to the metal raceway.

300.11 Securing and Supporting

(A) Secured in Place. Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place.

(B) Wiring Systems Installed Above Suspended Ceilings. Support wires that do not provide secure support shall not be permitted as the sole support. Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support. Where independent support wires are used, they shall be secured at both ends. Cables and raceways shall not be supported by ceiling grids.

(1) Fire-Rated Assemblies. Wiring located within the cavity of a fire-rated floor-ceiling or roof-ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be permitted to be attached to the assembly. Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means from those that are part of the fire-rated design.


Exception: The ceiling support system shall be permitted to support wiring and equipment that have been tested as part of the fire-rated assembly.

(2) Non–Fire-Rated Assemblies. Wiring located within the cavity of a non–fire-rated floor-ceiling or roof-ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be permitted to be attached to the assembly. Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means.

Informational Note: Where the wiring method is conduit, the wiring method is conduit, tubing, Type AC cable, Type MC cable, Type MI cable, nonmetallic-sheathed cable, or other cables, a box or conduit body shall be installed at each conductor splice point, outlet point, switch point, junction point, termination point, or pull point, unless otherwise permitted in 300.15(A) through (L).

300.14 Length of Free Conductors at Outlets, Junctions, and Switch Points
At least 150 mm (6 in.) of free conductor, measured from the point in the box where it emerges from its raceway or cable sheath, shall be left at each outlet, junction, and switch point for splices or the connection of luminaires or devices. Where the opening to an outlet, junction, or switch point is less than 200 mm (8 in.) in any direction, each conductor shall be long enough to extend at least 75 mm (3 in.) outside the opening.

Exception: Conductors that are not spliced or terminated at the outlet, junction, or switch point shall not be required to comply with 300.14.

300.15 Boxes, Conduit Bodies, or Fittings — Where Required
A box shall be installed at each outlet and switch point for concealed knob-and-tube wiring.

Fittings and connectors shall be used only with the specific wiring methods for which they are designed and listed.

Where the wiring method is conduit, tubing, Type AC cable, Type MC cable, Type MI cable, nonmetallic-sheathed cable, or other cables, a box or conduit body shall be installed at each conductor splice point, outlet point, switch point, junction point, termination point, or pull point, unless otherwise permitted in 300.15(A) through (L).

314.2 Round Boxes
Round boxes shall not be used where conduits or connectors requiring the use of locknuts or bushings are to be connected to the side of the box.

314.4 Metal Boxes
Metal boxes shall be grounded and bonded in accordance with Parts I, IV, V, VI, VII, and X of Article 250 as applicable, except as permitted in 250.112(I).
314.15 Damp or Wet Locations. In damp or wet locations, boxes, conduit bodies, outlet box hoods, and fittings shall be placed or equipped so as to prevent moisture from entering or accumulating within the box, conduit body, or fitting. Boxes, conduit bodies, outlet box hoods, and fittings installed in wet locations shall be listed for use in wet locations. Approved drainage openings not smaller than 3 mm (1/8 in.) and not larger than 6 mm (1/4 in.) in diameter shall be permitted to be installed in the field boxes or conduit bodies listed for use in damp or wet locations. For installation of listed drain fittings, larger openings are permitted to be installed in the field in accordance with manufacturer’s instructions.

Informational Note No. 1: For boxes in floors, see 314.27(B).
Informational Note No. 2: For protection against corrosion, see 300.6.

314.16 Number of Conductors in Outlet, Device, and Junction Boxes, and Conduit Bodies
Boxes and conduit bodies shall be of an approved size to provide free space for all enclosed conductors. In no case shall the volume of the box, as calculated in 314.16(A), be less than the fill calculation as calculated in 314.16(B). The minimum volume for conduit bodies shall be as calculated in 314.16(C).

The provisions of this section shall not apply to terminal housings supplied with motors or generators.

Informational Note: For volume requirements of motor or generator terminal housings, see 430.12.

Boxes and conduit bodies enclosing conductors 4 AWG or larger shall also comply with the provisions of 314.28.

(A) Box Volume Calculations. The volume of a wiring enclosure (box) shall be the total volume of the assembled sections and, where used, the space provided by plaster rings, domed covers, extension rings, and so forth, that are marked with their volume or are made from boxes the dimensions of which are listed in Table 314.16(A). Where a box is provided with one or more securely installed barriers, the volume shall be apportioned to each of the resulting spaces. Each barrier, if not marked with its volume, shall be considered to take up 8.2 cm³ (1/2 in³) if metal, and 16.4 cm³ (1 in³) if nonmetallic.

(1) Standard Boxes. The volumes of standard boxes that are not marked with their volume shall be as given in Table 314.16(A).

(2) Other Boxes. Boxes 1650 cm³ (100 in³) or less, other than those described in Table 314.16(A), and nonmetallic boxes shall be durably and legibly marked by the manufacturer with their volume(s). Boxes described in Table 314.16(A) that have a volume larger than is designated in the table shall be permitted to have their volume marked as required by this section.

(B) Box Fill Calculations. The volumes in paragraphs 314.16(B)(1) through (B)(5), as applicable, shall be added together. No allowance shall be required for small fittings such as knockouts and bushings. Each space within a box installed with a barrier shall be calculated separately.

(1) Conductor Fill. Each conductor that originates outside the box and terminates or is spliced within the box shall be counted once, and each conductor that passes through the box without splice or termination shall be counted once. Each loop or coil of unbroken conductor not less than twice the minimum length required for free conductors in 300.14 shall be counted twice. The conductor fill shall be calculated using Table 314.16(B). A conductor, no part of which leaves the box, shall not be counted.

Exception: An equipment grounding conductor or conductors or not over four fixture wires smaller than 14 AWG, or both, shall be permitted to be omitted from the calculations where they enter a box from a domed luminaire or similar canopy and terminate within the box.

(2) Clamp Fill. Where one or more internal cable clamps, whether factory or field supplied, are present in the box, a single volume allowance in accordance with Table 314.16(B) shall be made based on the largest conductor present in the box. No allowance shall be required for a cable connector with its clamping mechanism outside the box.

A clamp assembly that incorporates a cable termination for the cable conductors shall be listed and marked for use with specific nonmetallic boxes. Conductors that originate within the clamp assembly shall be included in conductor fill calculations covered in 314.16(B)(1) as though they entered from outside the box. The clamp assembly shall not require a fill allowance, but the volume of the portion of the assembly that remains within the box after installation shall be excluded from the box volume as marked in 314.16(A)(2).

(3) Support Fittings Fill. Where one or more luminaire studs or hickeys are present in the box, a single volume allowance in accordance with Table 314.16(B) shall be made for each type of fitting based on the largest conductor present in the box.

(4) Device or Equipment Fill. For each yoke or strap containing one or more devices or equipment, a double volume allowance in accordance with Table 314.16(B) shall be made for each yoke or strap based on the largest conductor connected to a device(s) or equipment support by that yoke or strap. A device or utilization equipment wider than a single 50 mm (2 in.) device box as described in Table 314.16(A) shall have double volume allowances provided for each gang required for mounting.

(5) Equipment Grounding Conductor Fill. Where one or more equipment grounding conductors or equipment bonding jumpers enter a box, a single volume allowance in accordance with Table 314.16(B) shall be made based on the largest equipment grounding conductor or equipment bonding jumper present in the box. Where an additional set of equipment grounding conductors, as permitted by 250.146(D), is present in the box, an additional volume allowance shall be made based on the largest equipment grounding conductor in the additional set.

(C) Conduit Bodies.

(1) General. Conduit bodies enclosing 6 AWG conductors or smaller, other than short-radius conduit bodies as described in 314.16(C)(5), shall have a cross-sectional area not less than twice the cross-sectional area of the largest conduit or tubing to which they can be attached. The maximum number of conductors permitted shall be the maximum number permitted by Table 1 of Chapter 9 for the conduit or tubing to which it is attached.

(2) With Splices, Taps, or Devices. Only those conduit bodies that are durably and legibly marked by the manufacturer with their volume shall be permitted to contain splices, taps, or devices. The maximum number of conductors shall be calculated in accordance with 314.16(B). Conduit bodies shall be supported in a rigid and secure manner.
### TABLE 314.16(A) Metal Boxes

<table>
<thead>
<tr>
<th>Box Trade Size</th>
<th>Minimum Volume</th>
<th>Maximum Number of Conductors* (arranged by AWG size)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cm³</td>
<td>in.³</td>
</tr>
<tr>
<td>100 × 32</td>
<td>205</td>
<td>12.5</td>
</tr>
<tr>
<td>100 × 38</td>
<td>254</td>
<td>15.5</td>
</tr>
<tr>
<td>100 × 54</td>
<td>353</td>
<td>21.5</td>
</tr>
<tr>
<td>100 × 32</td>
<td>295</td>
<td>18.0</td>
</tr>
<tr>
<td>100 × 38</td>
<td>344</td>
<td>21.0</td>
</tr>
<tr>
<td>100 × 54</td>
<td>497</td>
<td>30.3</td>
</tr>
<tr>
<td>120 × 32</td>
<td>418</td>
<td>25.5</td>
</tr>
<tr>
<td>120 × 38</td>
<td>484</td>
<td>29.5</td>
</tr>
<tr>
<td>120 × 54</td>
<td>689</td>
<td>42.0</td>
</tr>
<tr>
<td>75 × 50 × 38</td>
<td>123</td>
<td>7.5</td>
</tr>
<tr>
<td>75 × 50 × 50</td>
<td>164</td>
<td>10.0</td>
</tr>
<tr>
<td>75 × 50 × 65</td>
<td>172</td>
<td>10.5</td>
</tr>
<tr>
<td>75 × 50 × 70</td>
<td>205</td>
<td>12.5</td>
</tr>
<tr>
<td>75 × 50 × 90</td>
<td>230</td>
<td>14.0</td>
</tr>
<tr>
<td>100 × 54 × 38</td>
<td>169</td>
<td>10.3</td>
</tr>
<tr>
<td>100 × 54 × 48</td>
<td>213</td>
<td>13.0</td>
</tr>
<tr>
<td>100 × 54 × 54</td>
<td>238</td>
<td>14.5</td>
</tr>
<tr>
<td>95 × 50 × 65</td>
<td>230</td>
<td>14.0</td>
</tr>
<tr>
<td>95 × 50 × 90</td>
<td>344</td>
<td>21.0</td>
</tr>
<tr>
<td>min. 44.5 depth</td>
<td>FS — single cover/gang (1/4)</td>
<td>221</td>
</tr>
<tr>
<td>min. 60.3 depth</td>
<td>FD — single cover/gang (1/2)</td>
<td>295</td>
</tr>
<tr>
<td>min. 44.5 depth</td>
<td>FS — multiple cover/gang (1/4)</td>
<td>295</td>
</tr>
<tr>
<td>min. 60.3 depth</td>
<td>FD — multiple cover/gang (1/2)</td>
<td>395</td>
</tr>
</tbody>
</table>

*Where no volume allowances are required by 314.16(B)(2) through (B)(5).

### TABLE 314.16(B) Volume Allowance Required per Conductor

<table>
<thead>
<tr>
<th>Size of Conductor (AWG)</th>
<th>Free Space Within Box for Each Conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm³</td>
<td>in.³</td>
</tr>
<tr>
<td>18</td>
<td>24.6</td>
</tr>
<tr>
<td>16</td>
<td>28.7</td>
</tr>
<tr>
<td>14</td>
<td>32.8</td>
</tr>
<tr>
<td>12</td>
<td>36.9</td>
</tr>
<tr>
<td>10</td>
<td>41.0</td>
</tr>
<tr>
<td>8</td>
<td>49.2</td>
</tr>
<tr>
<td>6</td>
<td>81.9</td>
</tr>
</tbody>
</table>

### 314.17 Conductors Entering Boxes, Conduit Bodies, or Fittings

Conductors entering boxes, conduit bodies, or fittings shall be protected from abrasion and shall comply with 314.17(A) through (D).

**(A) Openings to Be Closed.** Openings through which conductors enter shall be closed in an approved manner.

**(B) Metal Boxes and Conduit Bodies.** Where metal boxes or conduit bodies are installed with messenger-supported wiring, open wiring on insulators, or concealed knob-and-tube wiring, conductors shall enter through insulating bushings or, in dry locations, through flexible tubing extending from the last insulating support to not less than 6 mm (1/4 in.) inside the box and beyond any cable clamps. Where non-metallic-sheathed cable or multiconductor Type UF cable is used, the sheath shall extend not less than 6 mm (1/4 in.) inside the box and beyond any cable clamp. Except as provided in 300.15(C), the wiring shall be firmly secured to the box or conduit body. Where raceway or cable is installed with metal boxes or conduit bodies, the raceway or cable shall be secured to such boxes and conduit bodies.

### 314.19 Boxes Enclosing Flush Devices

Boxes used to enclose flush devices shall be of such design that the devices will be completely enclosed on back and sides and substantial support for the devices will be provided. Screws for supporting the box shall not also be used to attach a device.

### 314.20 Flush-Mounted Installations

Installations within or behind a surface of concrete, tile, gypsum, plaster, or other noncombustible material, including boxes employing a flush-type cover or faceplate, shall be made so that the front edge of the box, plaster ring, extension ring, or listed extender will not be set back of the finished surface more than 6 mm (1/4 in.).

Installations within a surface of wood or other combustible surface material, boxes, plaster rings, extension rings, or listed extenders shall extend to the finished surface or project therefrom.
314.21 Repairing Noncombustible Surfaces
Noncombustible surfaces that are broken or incomplete around boxes employing a flush-type cover or faceplate shall be repaired so there will be no gaps or open spaces greater than 3 mm (1/8 in.) at the edge of the box.

314.27 Outlet Boxes

(A) Boxes at Luminaire or Lampholder Outlets. Outlet boxes or fittings designed for the support of luminaires and lampholders, and installed as required by 314.23, shall be permitted to support a luminaire or lampholder.

1 Vertical Surface Outlets. Boxes used at luminaire or lampholder outlets in or on a vertical surface shall be identified and marked on the interior of the box to indicate the maximum weight of the luminaire that is permitted to be supported by the box if other than 23 kg (50 lb).

Exception: A vertically mounted luminaire or lampholder weighing not more than 3 kg (6 lb) shall be permitted to be supported on other boxes or plaster rings that are secured to other boxes, provided that the luminaire or its supporting yoke, or the lampholder, is secured to the box with no fewer than two No. 6 or larger screws.

(2) Ceiling Outlets. At every outlet used exclusively for lighting, the box shall be designed or installed so that a luminaire or lampholder may be attached. Boxes shall be required to support a luminaire weighing a minimum of 23 kg (50 lb). A luminaire that weighs more than 23 kg (50 lb) shall be supported independently of the outlet box, unless the outlet box is listed for not less than the weight to be supported. The interior of the box shall be marked by the manufacturer to indicate the maximum weight the box shall be permitted to support.

(B) Floor Boxes. Boxes listed specifically for this application shall be used for receptacles located in the floor.

Exception: Where the authority having jurisdiction judges them free from likely exposure to physical damage, moisture, and dirt, boxes located in elevated floors of show windows and similar locations shall be permitted to be other than those listed for floor applications. Receptacles and covers shall be listed as an assembly for this type of location.

(C) Boxes at Ceiling-Suspended (Paddle) Fan Outlets. Outlet boxes or outlet box systems used as the sole support of a ceiling-suspended (paddle) fan shall be listed, shall be marked by their manufacturer as suitable for this purpose, and shall not support ceiling-suspended (paddle) fans that weigh more than 32 kg (70 lb). For outlet boxes or outlet box systems designed to support ceiling-suspended (paddle) fans that weigh more than 16 kg (35 lb), the required marking shall include the maximum weight to be supported.

Where spare, separately switched, ungrounded conductors are provided to a ceiling-mounted outlet box, in a location acceptable for a ceiling-suspended (paddle) fan in one-family, two-family, or multifamily dwellings, the outlet box or outlet box system shall be listed for sole support of a ceiling-suspended (paddle) fan.

(D) Utilization Equipment. Boxes used for the support of utilization equipment other than ceiling-suspended (paddle) fans shall meet the requirements of 314.27(A) for the support of a luminaire that is the same size and weight.

Exception: Utilization equipment weighing not more than 3 kg (6 lb) shall be permitted to be supported on other boxes or plaster rings that are secured to other boxes, provided the equipment or its supporting yoke is secured to the box with no fewer than two No. 6 or larger screws.

314.28 Pull and Junction Boxes and Conduit Bodies

Boxes and conduit bodies used as pull or junction boxes shall comply with 314.28(A) through (E).

(A) Minimum Size. For raceways containing conductors of 4 AWG or larger that are required to be insulated, and for cables containing conductors of 4 AWG or larger, the minimum dimensions of pull or junction boxes installed in a raceway or cable run shall comply with 314.28(A)(1) through (A)(3). Where an enclosure dimension is to be calculated based on the diameter of entering raceways, the diameter shall be the metric designator (trade size) expressed in the units of measurement employed.

1 Straight Pulls. In straight pulls, the length of the box or conduit body shall not be less than eight times the metric designator (trade size) of the largest raceway.

2 Angle or U Pulls, or Splices. Where splices or where angle or U pulls are made, the distance between each raceway entry inside the box or conduit body and the opposite wall of the box or conduit body shall not be less than six times the metric designator (trade size) of the largest raceway in a row. This distance shall be increased for additional entries by the amount of the sum of the diameters of all other raceway entries in the same row on the same wall of the box. Each row shall be calculated individually, and the single row that provides the maximum distance shall be used.

Exception: Where a raceway or cable entry is in the wall of a box or conduit body opposite a removable cover, the distance from that wall to the cover shall be permitted to comply with the distance required for one wire per terminal in Table 312.6(A).

The distance between raceway entries enclosing the same conductor shall not be less than six times the metric designator (trade size) of the larger raceway.

When transposing cable size into raceway size in 314.28(A)(1) and (A)(2), the minimum metric designator (trade size) raceway required for the number and size of conductors in the cable shall be used.

3) Smaller Dimensions. Listed boxes or listed conduit bodies of dimensions less than those required in 314.28(A)(1) and (A)(2) shall be permitted for installations of combinations of conductors that are less than the maximum conduit or tubing fill (of conduits or tubing being used) permitted by Table 1 of Chapter 9.

Listed conduit bodies of dimensions less than those required in 314.28(A)(2), and having a radius of the curve to the centerline not less than that indicated in Table 2 of Chapter 9 for one-shot and single-shoe benders, shall be permitted for installations of combinations of conductors permitted by Table 1 of Chapter 9. These conduit bodies shall be marked to show they have been specifically evaluated in accordance with this provision.

Where the permitted combinations of conductors for which the box or conduit body has been listed are less than the maximum conduit or tubing fill permitted by Table 1 of Chapter 9, the box or conduit body shall be permanently marked with the maximum number and maximum size of conductors permitted. For other conductor sizes and combinations, the total cross-sectional area of the fill shall not exceed the cross-sectional area of the conductors specified in the marking, based on the type of conductor identified as part of the product listing.

314.29 Boxes, Conduit Bodies, and Handhole Enclosures to Be Accessible

Boxes, conduit bodies, and handhole enclosures shall be installed so that the wiring contained in them can be rendered accessible without removing any part of the building or structure or, in underground circuits, without excavating sidewalks, paving, earth, or other substance that is to be used to establish the finished grade.
406.9 Receptacles in Damp or Wet Locations

(A) Damp Locations. A receptacle installed outdoors in a location protected from the weather or in other damp locations shall have an enclosure for the receptacle that is weatherproof when the receptacle is covered (attachment plug cap not inserted and receptacle covers closed).

An installation suitable for wet locations shall also be considered suitable for damp locations.

A receptacle shall be considered to be in a location protected from the weather where located under roofed open porches, canopies, marquees, and the like, and will not be subjected to a beating rain or water runoff. All 15- and 20-ampere, 125- and 250-volt nonlocking receptacles shall be a listed weather-resistant type.

Informational Note: The types of receptacles covered by this requirement are identified as 5-15, 5-20, 6-15, and 6-20 in ANSI/NEMA WD 6-2012, Wiring Devices — Dimensional Specifications.

(B) Wet Locations.

(1) Receptacles of 15 and 20 Amperes in a Wet Location. Receptacles of 15 and 20 amperes, 125 and 250 volts installed in a wet location shall have an enclosure that is weatherproof whether or not the attachment plug cap is inserted. An outlet box hood installed for this purpose shall be listed and shall be identified as “extra-duty.” Other listed products, enclosures, or assemblies providing weatherproof protection that do not utilize an outlet box hood need not be marked “extra-duty.”

Informational Note No. 1: Requirements for extra-duty outlet box hoods are found in ANSI/UL 514D—2013, Cover Plates for Flush-Mounted Wiring Devices. “Extra duty” identification and requirements are not applicable to listed receptacles, faceplates, outlet boxes, enclosures, or assemblies that are identified as either being suitable for wet locations or rated as one of the outdoor enclosure-type numbers of Table 110.28 that does not utilize an outlet box hood.

Exception: 15- and 20-ampere, 125- through 250-volt receptacles installed in a wet location and subject to routine high-pressure spray washing shall be permitted to have an enclosure that is weatherproof when the attachment plug is removed.

All 15- and 20-ampere, 125- and 250-volt nonlocking-type receptacles shall be listed and so identified as the weather-resistant type.

Informational Note No. 2: The configuration of weather-resistant receptacles covered by this requirement are identified as 5-15, 5-20, 6-15, and 6-20 in ANSI/NEMA WD 6-2012, Wiring Devices — Dimensional Specifications.

(2) Other Receptacles. All other receptacles installed in a wet location shall comply with (B)(2)(a) or (B)(2)(b).

(a) A receptacle installed in a wet location, where the product intended to be plugged into it is not attended while in use, shall have an enclosure that is weatherproof with the attachment plug cap inserted or removed.

(b) A receptacle installed in a wet location where the product intended to be plugged into it will be attended while in use (e.g., portable tools) shall have an enclosure that is weatherproof when the attachment plug is removed.

406.12 Tamper-Resistant Receptacles. All 15- and 20-ampere, 125- and 250-volt nonlocking-type receptacles in the areas specified in 406.12(1) through (7) shall be listed tamper-resistant receptacles.

(1) Dwelling units in all areas specified in 210.52 and 550.13
(2) Guest rooms and guest suites of hotels and motels
(3) Child care facilities
(4) Preschools and elementary education facilities
(5) Business offices, corridors, waiting rooms and the like in clinics, medical and dental offices and outpatient facilities
(6) Subset of assembly occupancies described in 518.2 to include places of waiting transportation, gymnasia, skating rinks, and auditoriums
(7) Dormitories

Informational Note: This requirement would include receptacles identified as 5-15, 5-20, 6-15 and 6-20 in ANSI/NEMA WD 6-2016, Wiring Devices — Dimensional Specifications.

Exception to (A), (B), and (C): Receptacles in the following locations shall not be required to be tamper resistant:

(1) Receptacles located more than 1.7 m (512 ft) above the floor.
(2) Receptacles that are part of a luminaire or appliance.
(3) A single receptacle or a duplex receptacle for two appliances located within the dedicated space for each appliance that, in normal use, is not easily moved from one place to another and that is cord-and plug-connected in accordance with 400.10(A)(6), (A)(7), or (A)(8).
(4) Nongrounding receptacles used for replacements as permitted in 406.4(D)(2)(a).

410.36 Means of Support

(A) Outlet Boxes. Outlet boxes or fittings installed as required by 314.23 and complying with the provisions of 314.27(A)(1) and 314.27(A)(2) shall be permitted to support luminaires.

(B) Suspended Ceilings. Framing members of suspended ceiling systems used to support luminaires shall be securely fastened to each other and shall be securely attached to the building structure at appropriate intervals. Luminaires shall be securely fastened to the ceiling framing member by mechanical means such as bolts, screws, or rivets. Listed clips identified for use with the type of ceiling framing member(s) and luminaire(s) shall also be permitted.

(C) Luminaire Studs. Luminaire studs that are not a part of outlet boxes, hickeys, tripods, and crowfeet shall be made of steel, malleable iron, or other material suitable for the application.

680.52 Junction Boxes and Other Enclosures

(A) General. Junction boxes and other enclosures used for other than underwater installation shall comply with 680.24.

(B) Underwater Junction Boxes and Other Underwater Enclosures. Junction boxes and other underwater enclosures shall meet the requirements of 680.52(B)(1) and (B)(2).

(1) Construction.

a. Underwater enclosures shall be equipped with provisions for threaded conduit entries or compression glands or seals for cord entry.

b. Underwater enclosures shall be submersible and made of copper, brass, or other approved corrosion-resistant material.

(2) Installation. Underwater enclosure installations shall comply with (a) and (b).

a. Underwater enclosures shall be filled with an approved potting compound to prevent the entry of moisture.

b. Underwater enclosures shall be firmly attached to the supports or directly to the fountain surface and bonded as required. Where the junction box is supported only by conduits in accordance with 314.23(E) and (F), the conduits shall be of copper, brass, stainless steel, or other approved corrosion-resistant metal. Where the box is fed by nonmetallic conduit, it shall have additional supports and fasteners of copper, brass, or other approved corrosion-resistant material.