Alachua County
Department of Growth Management

Building Division

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Alachua County Semi-Perm Inspection Guide

This form is intended as a basic guide and does not cover all codes that may be relevant to your project.
This form shall be provided to applicants at time of permit issuance.

All work shall comply with The Florida Building Code, NEC, and manufacturer installation instructions enforced at the time of application.

Inspection Requirements

2045 – Semi Permanent Power

Purpose of inspection:

The purpose of the "Semi Perm" inspection is to verify the readiness for a structure or residence to receive electricity from the utility company. The guide below is to ensure code compliance as well as general safety. Not all items will have code sections but are determined by the Building Official as required.

Service:

1. Working clearances per NEC 110.26 (A), 230.70(A).
2. Overhead service conductors have proper clearance from ground, NEC 230.24, 230.26.
3. Service mast is supported and attached per NEC 230.28.
4. Underground service riser & all raceway secured per NEC section for raceway type.
5. Service equipment is mounted to building, or pedestal, per NEC 110.13 (A), 110.26.
6. Marked as "Suitable for use as service equipment" per NEC 230.66(A).
7. ¼" clearance maintained behind and around enclosures per NEC 312.2.
8. Raceways entering above live parts shall use listed fitting per NEC 312.2, 314.15.
9. Raceways sealed per NEC 225.27, 230.8, and 300.7(A).
10. Service conductors sized and terminated correctly per NEC 110.14(D), 310.12, 310.15.
11. Torque values indicated by markings per NEC 110.14 (D).
12. Emergency disconnect labeled per NEC 230.85.
13. Seal unused openings with KO seals suitable for location per NEC 110.12(A), 312.2, 314.15.
14. Work is installed in a neat and workmanlike manner per NEC 110.12.

Grounding and Bonding:

1. Grounding electrode installed per NEC 250.50.
2. Grounding electrode conductor installed per NEC 250.62-70.
   (Consult with local utility if connected to meter of first means of disconnect).
3. Supplemental electrode installed per NEC 250.53 (A)(2).
4. All grounding electrodes that are installed are bonded together per NEC 250.50.
5. Intersystem bonding termination device installed per NEC 250.94 (A).

Panels: Dead front to be on for inspection, secured with 2 screws.

1. All branch circuits complete, overcurrent protection installed, and wires properly sized.
2. Surge Protection device installed per NEC 230.67.
3. Panel and subpanels directory labeled per NEC 408.4(A).
4. GFCI protection installed on branch circuits, at device or breaker, as required by NEC 210.8(A).
5. AFCI protection installed on all branch circuits as required by NEC 210.12.
6. All unused openings sealed per NEC 408.7.
7. Work is installed in a neat and workmanlike manner per NEC 110.12.

Exterior:

1. A 911 address is required to be posted on the structure per FBC 319.1.
2. All conductors on the exterior of the structure are required to be installed or made safe using temporary boxes and covers. There is no height exception for this.
3. Outlets requiring weatherproof protection are required to be installed per NEC 406.9(A) & (B).

Interior:

1. All devices, equipment, and luminaires shall be installed to the extent possible. Un-terminated conductors shall be made safe using temporary boxes and covers, or wire nuts and electrical tape. There is no height exception for this.
2. Receptacle covers are required to be installed per NEC 406.6.
3. Receptacles requiring GFCI protection must have that protection at the device or breaker NEC 210.8.
4. Receptacles requiring AFCI protection must have that protection at the breaker or installed per NEC 210.12.

This guide stresses the electrical system shall be as complete as possible so that when energized the structure will be as safe to operate as it would be once the system is 100% complete.

Upon an “Approved” result, county staff will notify the appropriate utility that the structure is ready to be energized. The building department has no oversight of the utility installation schedule. The utility will not energize if there are any notes or deficiencies listed on the inspection.
A “Failed” or “Failed w/ fee” result will be entered if any of the above items are deficient. Corrections will need to be made and fees paid before another inspection is scheduled.

If you feel you have a situation where you will not be able to comply with this guide, please contact the Assistant Building Official to discuss a plan for alternate compliance.

Code References for Common Inspection Failures
NFPA70 - NEC

110.12 Mechanical Execution of Work.
Electrical equipment shall be installed in a professional and skillful manner.
(A) Unused Openings.
Unused openings, other than those intended for the operation of equipment, those intended for mounting purposes, or those permitted as part of the design for listed equipment, shall be closed to afford protection substantially equivalent to the wall of the equipment. Where metallic plugs or plates are used with nonmetallic enclosures, they shall be recessed at least 6 mm (1⁄4 in.) from the outer surface of the enclosure.

110.13 Mounting and Cooling of Equipment.
(A) Mounting.
Electrical equipment shall be firmly secured to the surface on which it is mounted. Wooden plugs driven into holes in masonry, concrete, plaster, or similar materials shall not be used.

110.14 (D) Terminal Connection Torque
Tightening torque values for terminal connections shall be as indicated as a numeric value on equipment or in installation instructions provided by the manufacturer, a calibrated torque tool shall be used to achieve the indicated torque value, unless the equipment manufacturer has provided installation instructions for an alternative method of achieving the required torque.
Alachua County accepts the use of "torque markings" as indication of correct torque values.

110.26 (A) Working Space
Working space for equipment likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), 110.26(A)(2), 110.26(A)(3), and 110.26(A)(4) or as required or permitted elsewhere in this code.

110.26 (A)(1) Depth of Working Space.
The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a)or 110.26(A)(1)(b) are met. Distances shall be measured from the enclosure front or opening, if such live parts are enclosed.

110.26 (A)(2) Width of Working Space.
The width of the working space in front of the electrical equipment shall be the width of the equipment or 762 mm (30 in.), whichever is greater. In all cases, the work space shall permit at least a 90-degree opening of equipment doors or hinged panels.

110.26 (A)(3) Height of Working Space.
The work space shall be clear and extend from the grade, floor, or platform to a height of 2.0 m (6 1⁄2 ft) or the height of the equipment, whichever is greater. Within the height requirements of this section, other equipment or support structures, such as concrete pads, associated with the electrical installation and located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.
Exception No. 1:
On battery systems mounted on open racks, the top clearance shall comply with 480.10(D).
Exception No. 2:
In existing dwelling units, service equipment or enclosed panelboards that do not exceed 200 amperes shall be

permitted in spaces where the height of the working space is less than 2.0 m (6 1⁄2 ft).
Exception No. 3:
Meters that are installed in meter sockets shall be permitted to extend beyond the other equipment. The meter socket shall be required to follow the rules of this section.

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.
A listed Class A GFCI shall provide protection in accordance with 210.8(A) through (F). The GFCI shall be installed in a readily accessible location.
For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.
(A) Dwelling Units.
All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground 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
(4) Crawl spaces — at or below grade level
(5) Basements
(6) Kitchens
(7) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking
(8) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink
(9) Boathouses
(10) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall
(11) Laundry areas
(12) Indoor damp and wet locations
Exception No. 1:
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:
A receptacle supplying only a permanently installed premises security system shall be permitted to omit ground-fault circuit-interrupter protection.
Exception No. 3:
Listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan shall be permitted to omit ground-fault circuit-interrupter protection. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.
Exception No. 4:
Factory-installed receptacles that are not readily accessible and are mounted internally to bathroom exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

210.12 Arc-Fault Circuit-Interrupter Protection.
Arc-fault circuit-interrupter (AFCI) protection shall be installed in accordance with 210.12(B) through (E) by any of the means described in 210.12(A)(1) through (A)(6). The AFCI shall be listed and installed in a readily accessible location.

(A) Means of Protection.
AFCI protection shall be provided by any of the following means:
(1) A listed combination-type AFCI 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 AFCI installed on the branch circuit at the first outlet box, which shall be marked to indicate that it is the first outlet of the branch 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 AFCI installed on the branch circuit at the first outlet box if 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 AFCI.
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 shall be marked to indicate that it is the first outlet of the branch circuit.
(4) A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch-circuit overcurrent protective device if 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 AFCI.
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 shall be marked to indicate that it is the first outlet of the branch 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 listed as such.
(5) If metal raceway, metal wireways, metal auxiliary gutters, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, metal conduit bodies, and metal enclosures 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.
(B) Dwelling Units.
All 120-volt, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A)(1) through (A)(6):
(1) Kitchens
(2) Family rooms
(3) Dining rooms
(4) Living rooms
(5) Parlors
(6) Libraries
(7) Dens
(8) Bedrooms
(9) Sunrooms
(10) Recreation rooms
(11) Closets
(12) Hallways
(13) Laundry areas

(14) Similar areas
Exception No. 1:
AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.
Exception No. 2:
AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit until January 1, 2025.

(C) Dormitory Units.

All 120-volt, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A)(1) through (A)(6):
(1) Bedrooms
(2) Living rooms
(3) Hallways
(4) Closets
(5) Bathrooms
(6) Similar rooms
(D) Other Occupancies.
All 120-volt, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A)(1) through (A)(6):
(1) Guest rooms and guest suites of hotels and motels
(2) Areas used exclusively as patient sleeping rooms in nursing homes and limited-care facilities
(3) Areas designed for use exclusively as sleeping quarters in fire stations, police stations, ambulance stations, rescue stations, ranger stations, and similar locations

(E) Branch Circuit Wiring Extensions, Modifications, or Replacements.

If branch-circuit wiring for any of the areas specified in 210.12(B), (C), or (D) is modified, replaced, or extended, the branch circuit shall be protected by one of the following:
(1) By any of the means described in 210.12(A)(1) through (A)(6)
(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 branch-circuit conductors is not more than 1.8 m (6 ft) and does not include any additional outlets or devices, other than splicing devices. This measurement shall not include the conductors inside an enclosure, cabinet, or junction box.

215.6 Feeder Equipment Grounding Conductor

Where a feeder supplies branch circuits in which equipment grounding conductors are required, the feeder shall include or provide an equipment grounding conductor, to which the equipment grounding conductors of the branch circuits shall be connected.

225.27 Raceway Seal.

Where a raceway enters a building or structure from outside, it shall be sealed in accordance with 300.7(G) and 300.9(A). Spare or unused raceways shall also be sealed. Sealants shall be identified for use with cable insulation, conductor insulation, bare conductor, shield, or other components.

230.8 Raceway Seal.
Where a service raceway enters a building or structure, it shall be sealed in accordance with 300.7(G) and 300.9(A). Spare or unused raceways shall also be sealed. Sealants shall be identified for use with the cable insulation, conductor insulation, bare conductor, shield, or other components.

230.24 Clearances.
Overhead service conductors shall not be readily accessible and shall comply with 230.24(A) through 230.24(E).
(A) Above Roofs.
Conductors shall have a vertical clearance of not less than 2.6 m (8 ft 6 in.) above the roof surface. The vertical clearance above the roof level shall be maintained for a distance of not less than 900 mm (3 ft) in all directions from the edge of the roof.
Exception No. 1: The area above a roof surface subject to pedestrian or vehicular traffic shall have a vertical clearance from the roof surface in accordance with the clearance requirements of 230.24(B).
Exception No. 2: Where the voltage between conductors does not exceed 300 and the roof has a slope of 100 mm in 300 mm (4 in. in 12 in.) or greater, a reduction in clearance to 900 mm (3 ft) shall be permitted.
Exception No. 3: Where the voltage between conductors does not exceed 300, a reduction in clearance above only the overhanging portion of the roof to not less than 450 mm (18 in.) shall be permitted if (1) not more than 1.8 m (6 ft) of overhead service conductors, 1.2 m (4 ft) horizontally, pass above the roof overhang, and (2) they are terminated at a through-the-roof raceway or approved support.
Exception No. 4: The requirement for maintaining the vertical clearance 900 mm (3 ft) from the edge of the roof shall not apply to the final conductor span where the service drop or overhead service conductors are attached to the side of a building.
Exception No. 5: Where the voltage between conductors does not exceed 300 and the roof area is guarded or isolated, a reduction in clearance to 900 mm (3 ft) shall be permitted.
(B) Vertical Clearance for Overhead Service Conductors.
Overhead service conductors shall have the following minimum clearance from final grade:
(1) 3.0 m (10 ft) — at the electrical service entrance to buildings, also at the lowest point of the drip loop of the building electrical entrance, and above areas or sidewalks accessible only to pedestrians, measured from final grade or other accessible surface only for overhead service conductors supported on and cabled together with a grounded bare messenger where the voltage does not exceed 150 volts to ground
(2) 3.7 m (12 ft) — over residential property and driveways, and those commercial areas not subject to truck traffic where the voltage does not exceed 300 volts to ground
(3) 4.5 m (15 ft) — for those areas listed in the 3.7 m (12 ft) classification where the voltage exceeds 300 volts to ground
(4) 5.5 m (18 ft) — over public streets, alleys, roads, parking areas subject to truck traffic, driveways on other than residential property, and other land such as cultivated, grazing, forest, and orchard
(5) 7.5 m (241⁄2 ft) — over tracks of railroads
(C) Clearance from Building Openings.
Clearances from building openings shall comply with 230.9(C).
(D) Clearance from Swimming Pools, Fountains, and Similar Installations.
Clearances from swimming pools, fountains, and similar installations shall comply with 680.9.
(E) Clearance from Communication Wires and Cables.
Clearance from communication wires and cables shall be in accordance with 800.44(A)(4).

230.26 Point of Attachment.
The point of attachment of the overhead service conductors to a building or other structure shall provide the minimum clearances as specified in 230.9 and 230.24. In no case shall this point of attachment be less than 3.0 m (10 ft) above finished grade.

230.28 Service Masts as Supports.
Only power service-drop or overhead service conductors shall be permitted to be attached to a service mast. Service masts used for the support of service-drop or overhead service conductors shall be installed in accordance with 230.28(A) and 230.28(B).
(A) Strength.
The service mast shall be of adequate strength or be supported by braces or guy wires to withstand safely the strain imposed by the service-drop or overhead service conductors. Hubs intended for use with a conduit that serves as a service mast shall be identified for use with service-entrance equipment.
(B) Attachment.
Service-drop or overhead service conductors shall not be attached to a service mast between a weatherhead or the end of the conduit and a coupling, where the coupling is located above the last point of securement to the building or other structure or is located above the building or other structure.

230.66 Marking.
Service equipment shall be marked to identify it as being suitable for use as service equipment or suitable for use only as service equipment.

230.67 Surge Protection.
(A) Surge-Protective Device.
All services supplying the following occupancies shall be provided with a surge-protective device (SPD):
(1) Dwelling units
(2) Dormitory units
(3) Guest rooms and guest suites of hotels and motels
(4) Areas of nursing homes and limited-care facilities used exclusively as patient sleeping rooms
Informational Note:
See 517.10(B)(2).
(B) Location.
The SPD shall be an integral part of the service equipment or shall be located immediately adjacent thereto.
Exception:
The SPD shall not be required to be located at the service equipment as required in 230.67(B) if located at each next level distribution equipment downstream toward the load.
(C) Type.
The SPD shall be a Type 1 or Type 2 SPD.
(D) Replacement.
Where service equipment is replaced, all of the requirements of this section shall apply.
(E) Ratings.
SPDs shall have a nominal discharge current rating (In) of not less than 10kA.

230.70 (A) Service Disconnect Location.
Service disconnects shall be installed in accordance with 230.70(A)(1) through 230.70(A)(3).
(1) One- and Two-Family Dwellings.
Service disconnects shall be installed in a readily accessible outdoor location in accordance with one of the following:
(1) On the dwelling unit
(2) Within sight of the dwelling unit in accordance with 110.29
Exception:
The service disconnect shall not be required to be installed on or within sight of the dwelling unit when an emergency disconnect is installed in accordance with 225.41.

230.85 Emergency Disconnects.
For one- and two-family dwelling units, all service conductors shall terminate in disconnecting means having a short-circuit current rating equal to or greater than the available fault current, installed in a readily accessible outdoor location. If more than one disconnect is provided, they shall be grouped. Each disconnect shall be one of the following:
(1) Service disconnects marked as follows:
EMERGENCY DISCONNECT,
SERVICE DISCONNECT
(2) Meter disconnects installed per 230.82(3) and marked as follows:
EMERGENCY DISCONNECT,
METER DISCONNECT, NOT SERVICE EQUIPMENT
(3) Other listed disconnect switches or circuit breakers on the supply side of each service disconnect that are suitable for use as service equipment and marked as follows:
EMERGENCY DISCONNECT, NOT SERVICE EQUIPMENT

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.

250.28 Main Bonding Jumper and System Bonding Jumper
(A) Material
Main bonding jumpers and system bonding jumpers shall be of copper, aluminum, copper-clad aluminum, or other corrosion-resistant material. A main bonding jumper and a system bonding jumper shall be a wire, bus, screw, or similar suitable conductor.
(B) Construction
If a main bonding jumper or a system bonding jumper is a screw only, the screw shall be identified with a green finish that shall be visible with the screw installed.
(C) Attachment
Main bonding jumpers and system bonding jumpers shall be connected by one or more of the methods in 250.8 that is suitable for the material of the bonding jumper and enclosure.

250.50 Grounding Electrode System.
All grounding electrodes as described in 250.52(A)(1) through (A)(7) that are present at each building or structure served shall be bonded together to form the grounding electrode system. If none of these grounding electrodes exist, one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(8) shall be installed and used.
Exception:
Concrete-encased electrodes of existing buildings or structures shall not be required to be part of the grounding electrode system if the rebar is not accessible for use without disturbing the concrete.

250.52 Grounding Electrodes.

(A) Electrodes Permitted for Grounding.

(1) Metal Underground Water Pipe.

A metal underground water pipe in direct contact with the earth for 3.0 m (10 ft) or more (including any metal well casing bonded to the pipe) and electrically continuous (or made electrically continuous by bonding around insulating joints or insulating pipe) to the points of connection of the grounding electrode conductor and the bonding conductor(s) or jumper(s), if installed.

(2) Metal In-ground Support Structure(s).

One or more metal in-ground support structure(s) in direct contact with the earth vertically for 3.0 m (10 ft) or more, with or without concrete encasement. If multiple metal in-ground support structures are present at a building or a structure, it shall be permissible to bond only one into the grounding electrode system.

(3) Concrete-Encased Electrode.

A concrete-encased electrode shall consist of at least 6.0 m (20 ft) of either of the following:

(1) One or more bare or zinc galvanized or other electrically conductive coated rebar of not less than 13 mm (1⁄2 in.) in diameter, installed in one continuous 6.0 m (20 ft) length, or if in multiple pieces, the rebar shall be connected together by steel tie wires, exothermic welding, welding, or other effective means to create a 6.0 m (20 ft) or greater length

(2) Bare copper conductor not smaller than 4 AWG

Metal components shall be encased by at least 50 mm (2 in.) of concrete and shall be located horizontally within that portion of a concrete foundation or footing that is in direct contact with the earth or within vertical foundations or structural components or members that are in direct contact with the earth. If multiple concrete-encased electrodes are present at a building or structure, it shall be permissible to bond only one into the grounding electrode system.

(4) Ground Ring.

A ground ring encircling the building or structure, in direct contact with the earth, consisting of at least 6.0 m (20 ft) of bare copper conductor not smaller than 2 AWG.

(5) Rod and Pipe Electrodes.

Rod and pipe electrodes shall not be less than 2.44 m (8 ft) in length and consist of the following materials.

(1) Grounding electrodes of pipe or conduit shall not be smaller than metric designator 21 (trade size 3⁄4) and, where of steel, shall have the outer surface galvanized or otherwise metal-coated for corrosion protection.

(2) Rod-type grounding electrodes of stainless steel and copper or zinc-coated steel shall be at least 15.87 mm (5⁄8 in.) in diameter, unless listed.

(6) Other Listed Electrodes.

Other listed grounding electrodes shall be permitted.

(7) Plate Electrodes.

Each plate electrode shall expose not less than 0.186 m2 (2 ft2) of surface to exterior soil. Electrodes of bare or electrically conductive coated iron or steel plates shall be at least 6.4 mm (1⁄4 in.) in thickness. Solid, uncoated electrodes of nonferrous metal shall be at least 1.5 mm (0.06 in.) in thickness.

(8) Other Local Metal Underground Systems or Structures.

Other local metal underground systems or structures such as piping systems, underground tanks, and underground metal well casings that are not bonded to a metal water pipe.

(B) Not Permitted for Use as Grounding Electrodes.

The following systems and materials shall not be used as grounding electrodes:

(1) Metal underground gas piping systems

(2) Aluminum

(3) The structures and structural rebar described in 680.26(B)(1) and (B)(2)

250.53 Grounding Electrode System Installation.

(A) Rod, Pipe, and Plate Electrodes.

Rod, pipe, and plate electrodes shall be free from nonconductive coatings such as paint or enamel. Rod, pipe, and plate electrodes shall meet the requirements of 250.53(A)(1) through (A)(3).

(1) Below Permanent Moisture Level.

If practicable, rod, pipe, and plate electrodes shall be embedded below permanent moisture level.

(2) Supplemental Electrode Required.

A single rod, pipe, or plate electrode shall be supplemented by an additional electrode of a type specified in 250.52(A)(2) through (A)(8). The supplemental electrode shall be permitted to be bonded to one of the following:

(1) Rod, pipe, or plate electrode
(2) Grounding electrode conductor
(3) Grounded service-entrance conductor
(4) Nonflexible grounded service raceway
(5) Any grounded service enclosure

Exception:

If a single rod, pipe, or plate grounding electrode has a resistance to earth of 25 ohms or less, the supplemental electrode shall not be required.

(3) Supplemental Electrode.

If multiple rod, pipe, or plate electrodes are installed to meet the requirements of this section, they shall not be less than 1.8 m (6 ft) apart.

(4) Rod and Pipe Electrodes.

The electrode shall be installed such that at least 2.44 m (8 ft) of length is in contact with the soil. It shall be driven to a depth of not less than 2.44 m (8 ft) except that, where rock bottom is encountered, the electrode shall be driven at an oblique angle not to exceed 45 degrees from the vertical or, where rock bottom is encountered at an angle up to 45 degrees, the electrode shall be permitted to be buried in a trench that is at least 750 mm (30 in.) deep. The upper end of the electrode shall be flush with or below ground level unless the aboveground end and the grounding electrode conductor attachment are protected against physical damage as specified in 250.10.

(5) Plate Electrode.

Plate electrodes shall be installed not less than 750 mm (30 in.) below the surface of the earth.

(B) Electrode Spacing.

If more than one of the electrodes of the type specified in 250.52(A)(5) or (A)(7) are used, each electrode of one grounding system (including that used for strike termination devices) shall not be less than 1.83 m (6 ft) from any other electrode of another grounding system.

(C) Bonding Jumper.

The bonding jumper(s) used to connect the grounding electrodes together to form the grounding electrode system shall be installed in accordance with 250.64(A), (B), and (E), shall be sized in accordance with 250.66, and shall be connected in the manner specified in 250.70. Rebar shall not be used as a conductor to interconnect the electrodes of grounding electrode systems.

(D) Metal Underground Water Pipe.

If used as a grounding electrode, metal underground water pipe shall meet the requirements of 250.53(D)(1) and (D)(2).

(1) Continuity.

Continuity of the grounding path or the bonding connection to interior piping shall not rely on water meters or filtering devices and similar equipment.

(2) Supplemental Electrode Required.
A metal underground water pipe shall be supplemented by an additional electrode of a type specified in 250.52(A)(2) through (A)(8). If the supplemental electrode is of the rod, pipe, or plate type, it shall comply with 250.53(A). The supplemental electrode shall be bonded to one of the following:
(1) Grounding electrode conductor
(2) Grounded service-entrance conductor
(3) Nonflexible grounded service raceway
(4) Any grounded service enclosure
(5) As provided by 250.32(B)
Exception:
The supplemental electrode shall be permitted to be bonded to the interior metal water piping as specified in 250.68(C)(1).
(E) Supplemental Grounding Electrode Bonding Jumper Size.
If the supplemental electrode is a rod, pipe, or plate electrode, that portion of the bonding jumper that is the sole connection to the supplemental grounding electrode shall not be required to be larger than 6 AWG copper wire or 4 AWG aluminum or copper-clad aluminum wire.
(F) Ground Ring.
The ground ring shall be installed not less than 750 mm (30 in.) below the surface of the earth.

250.62 Grounding Electrode Conductor Material.
The grounding electrode conductor shall be of copper, aluminum, copper-clad aluminum, or the items as permitted in 250.68(C). The material selected shall be resistant to any corrosive condition existing at the installation or shall be protected against corrosion. Conductors of the wire type shall be solid or stranded, insulated, covered, or bare.

250.64 Grounding Electrode Conductor Installation.
Grounding electrode conductors at the service, at each building or structure where supplied by a feeder(s) or branch circuit(s), or at a separately derived system shall be installed as specified in 250.64(A) through (G).
(A) Aluminum or Copper-Clad Aluminum Conductors.
Grounding electrode conductors of bare, covered, or insulated aluminum or copper-clad aluminum shall comply with the following:
(1) Bare or covered conductors without an extruded polymeric covering shall not be installed where subject to corrosive conditions or be installed in direct contact with concrete.
(2) Terminations made within outdoor enclosures that are listed and identified for the environment shall be permitted within 450 mm (18 in.) of the bottom of the enclosure.
(3) Aluminum or copper-clad aluminum conductors external to buildings or equipment enclosures shall not be terminated within 450 mm (18 in.) of the earth.
(B) Securing and Protection against Physical Damage.
If exposed, a grounding electrode conductor or its enclosure shall be securely fastened to the surface on which it is carried. Grounding electrode conductors shall be permitted to be installed on or through framing members.
(1) Not Exposed to Physical Damage.
A 6 AWG or larger copper, copper-clad aluminum, or aluminum grounding electrode conductor not exposed to physical damage shall be permitted to be run along the surface of the building construction without metal covering or protection.

(2) Exposed to Physical Damage.
A 6 AWG or larger copper, copper-clad aluminum, or aluminum grounding electrode conductor exposed to physical damage shall be protected in rigid metal conduit (RMC), intermediate metal conduit (IMC), Schedule 80 rigid polyvinyl chloride conduit (PVC), reinforced thermosetting resin conduit Type XW (RTRC-XW), electrical metallic tubing (EMT), or cable armor.
(3) Smaller Than 6 AWG.
Grounding electrode conductors smaller than 6 AWG shall be protected in RMC, IMC, Schedule 80 PVC, RTRC-XW, EMT, or cable armor.
(4) In Contact with the Earth.
Grounding electrode conductors and grounding electrode bonding jumpers in contact with the earth shall not be required to comply with 300.5 or 305.15, but shall be buried or otherwise protected if subject to physical damage.

(C) Continuous.

Except as provided in 250.30(A)(5) and (A)(6), 250.30(B)(1), and 250.68(C), grounding electrode conductor(s) shall be installed in one continuous length without a splice or joint. If necessary, splices or connections shall be made as permitted in the following:
(1) Splicing of the wire-type grounding electrode conductor shall be permitted only by irreversible compression-type connectors listed as grounding and bonding equipment or by the exothermic welding process.
(2) Sections of busbars shall be permitted to be connected together to form a grounding electrode conductor.
(3) Bolted, riveted, or welded connections of structural metal frames of buildings or structures.
(4) Threaded, welded, brazed, soldered or bolted-flange connections of metal water piping.

(D) Building or Structure with Multiple Disconnecting Means in Separate Enclosures.

If a building or structure is supplied by a service or feeder with two or more disconnecting means in separate enclosures, the grounding electrode connections shall be made in accordance with 250.64(D)(1), (D)(2), or (D)(3).
(1) Common Grounding Electrode Conductor and Taps.
A common grounding electrode conductor and grounding electrode conductor taps shall be installed. The common grounding electrode conductor shall be sized in accordance with 250.66, based on the sum of the circular mil area of the largest ungrounded conductor(s) of each set of conductors that supplies the disconnecting means. If the service-entrance conductors connect directly to the overhead service conductors, service drop, underground service conductors, or service lateral, the common grounding electrode conductor shall be sized in accordance with Table 250.66, note 1.
A grounding electrode conductor tap shall extend to the inside of each disconnecting means enclosure. The grounding electrode conductor taps shall be sized in accordance with 250.66 for the largest service-entrance or feeder conductor serving the individual enclosure. The tap conductors shall be connected to the common grounding electrode conductor by one of the following methods in such a manner that the common grounding electrode conductor remains without a splice or joint:
(1) Exothermic welding.
(2) Connectors listed as grounding and bonding equipment.
(3) Connections to an aluminum or copper busbar not less than 6 mm thick × 50 mm wide (1⁄4 in. thick × 2 in. wide) and of a length to accommodate the number of terminations necessary for the installation. The busbar shall be securely fastened and shall be installed in an accessible location. Connections shall be made by a listed connector or by the exothermic welding process. If aluminum busbars are used, the installation shall comply with 250.64(A).

(2) Individual Grounding Electrode Conductors.
A grounding electrode conductor shall be connected between the grounding electrode system and one or more of the following, as applicable:
(1) Grounded conductor in each service equipment disconnecting means enclosure
(2) Equipment grounding conductor installed with the feeder(s) or branch circuit(s) for other than services
(3) Supply-side bonding jumper
Each grounding electrode conductor shall be sized in accordance with 250.66 based on the service-entrance or feeder conductor(s) supplying the individual disconnecting means.
(3) Common Location.
A grounding electrode conductor shall be connected in a wireway or other accessible enclosure on the supply side of the disconnecting means to one or more of the following, as applicable:
(1) Grounded service conductor(s)
(2) Equipment grounding conductor installed with the feeder
(3) Supply-side bonding jumper
The connection shall be made with exothermic welding or a connector listed as grounding and bonding equipment. The grounding electrode conductor shall be sized in accordance with 250.66 based on the service-entrance or feeder conductor(s) at the common location where the connection is made.
(E) Raceways, Cable Armor, and Enclosures for Grounding Electrode Conductors.
(1) General.
Ferrous metal raceways, enclosures, and cable armor for grounding electrode conductors shall be electrically continuous from the point of attachment to cabinets or equipment to the grounding electrode and shall be securely fastened to the ground clamp or fitting. Ferrous metal raceways, enclosures, and cable armor shall be bonded at each end of the raceway or enclosure to the grounding electrode or grounding electrode conductor to create an electrically parallel path. Nonferrous metal raceways, enclosures, and cable armor shall not be required to be electrically continuous.
(2) Methods.
Bonding shall be in compliance with 250.92(B) and ensured by one of the methods in 250.92(B)(2) through (B)(4).
(3) Size.
The bonding jumper for a grounding electrode conductor(s), raceway(s), enclosure(s), or cable armor shall be the same size as, or larger than, the largest enclosed grounding electrode conductor.
(4) Wiring Methods.
If a raceway is used as protection for a grounding electrode conductor, the installation shall comply with the requirements of the applicable raceway article.
(F) Installation to Electrode(s).
Grounding electrode conductor(s) and bonding jumpers interconnecting grounding electrodes shall be installed in accordance with one of the following. The grounding electrode conductor shall be sized for the largest grounding electrode conductor required among all the electrodes connected to it.
(1) The grounding electrode conductor shall be permitted to be run to any convenient grounding electrode available in the grounding electrode system where the other electrode(s), if any, is connected by bonding jumpers that are installed in accordance with 250.53(C).
(2) Grounding electrode conductor(s) shall be permitted to be run to one or more grounding electrode(s) individually.

(3) Bonding jumper(s) from grounding electrode(s) shall be permitted to be connected to an aluminum or copper busbar not less than 6 mm thick × 50 mm wide (1⁄4 in. thick × 2 in wide.) and of sufficient length to accommodate the number of terminations necessary for the installation. The busbar shall be securely fastened and shall be installed in an accessible location. Connections shall be made by a listed connector or by the exothermic welding process. The grounding electrode conductor shall be permitted to be run to the busbar. Where aluminum busbars are used, the installation shall comply with 250.64(A).

(G) Enclosures with Ventilation Openings.

Grounding electrode conductors shall not be installed through a ventilation opening of an enclosure.

250.66 Size of Alternating-Current Grounding Electrode Conductor.

The size of the grounding electrode conductor and bonding jumper(s) for connection of grounding electrodes shall not be smaller than given in Table 250.66, except as permitted in 250.66(A) through (C).

(A) Connections to a Rod, Pipe, or Plate Electrode(s).

If the grounding electrode conductor or bonding jumper connected to a single or multiple rod, pipe, or plate electrode(s), or any combination thereof, as described in 250.52(A)(5) or (A)(7), does not extend on to other types of electrodes that require a larger size conductor, the grounding electrode conductor shall not be required to be larger than 6 AWG copper wire or 4 AWG aluminum or copper-clad aluminum wire.

(B) Connections to Concrete-Encased Electrodes.

If the grounding electrode conductor or bonding jumper connected to a single or multiple concrete-encased electrode(s), as described in 250.52(A)(3), does not extend on to other types of electrodes that require a larger size of conductor, the grounding electrode conductor shall not be required to be larger than 4 AWG copper wire.

(C) Connections to Ground Rings.

If the grounding electrode conductor or bonding jumper connected to a ground ring, as described in 250.52(A)(4), does not extend on to other types of electrodes that require a larger size of conductor, the grounding electrode conductor shall not be required to be larger than the conductor used for the ground ring.

250.68 Grounding Electrode Conductor and Bonding Jumper Connection to Grounding Electrodes.

The connection of a grounding electrode conductor at the service, at each building or structure where supplied by a feeder(s) or branch circuit(s), or at a separately derived system and associated bonding jumper(s) shall be made as specified 250.68(A) through (C).

(A) Accessibility.

All mechanical elements used to terminate a grounding electrode conductor or bonding jumper to a grounding electrode shall be accessible.

Exception No. 1:

An encased or buried connection to a concrete-encased, driven, or buried grounding electrode shall not be required to be accessible.

Exception No. 2:

Exothermic or irreversible compression connections used at terminations, together with the mechanical means used to attach such terminations to fireproofed structural metal whether or not the mechanical means is reversible, shall not be required to be accessible.

(B) Effective Grounding Path.

The connection of a grounding electrode conductor or bonding jumper to a grounding electrode shall be made in a manner that will ensure an effective grounding path. Where necessary to ensure the grounding path for a metal piping system used as a grounding electrode, bonding shall be provided around insulated joints and around any equipment likely to be disconnected for repairs or replacement. Bonding jumpers shall be of sufficient length to permit removal of such equipment while retaining the integrity of the grounding path.

(C) Grounding Electrode Conductor Connections.

Grounding electrode conductors and bonding jumpers shall be permitted to be connected at the following locations and used to extend the connection to an electrode(s):

(1) Interior metal water piping that is electrically continuous with a metal underground water pipe electrode and is located not more than 1.52 m (5 ft) from the point of entrance to the building, as measured along the water piping, shall be permitted to extend the connection to an electrode(s). Interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building, as measured along the water piping, shall not be used as a conductor to interconnect electrodes of the grounding electrode system.

Exception:

In industrial, commercial, and institutional buildings or structures, if conditions of maintenance and supervision ensure that only qualified persons service the installation, interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building, as measured along the water piping, shall be permitted as a bonding conductor to interconnect electrodes that are part of the grounding electrode system, or as a grounding electrode conductor, if the entire length, other than short sections passing perpendicularly through walls, floors, or ceilings, of the interior metal water pipe that is being used for the conductor is exposed.

(2) The metal structural frame of a building shall be permitted to be used as a conductor to interconnect electrodes that are part of the grounding electrode system, or as a grounding electrode conductor. Hold-down bolts securing the structural steel column that are connected to a concrete-encased electrode complying with 250.52(A)(3) and located in the support footing or foundation shall be permitted to connect the metal structural frame of a building or structure to the concrete-encased grounding electrode. The hold-down bolts shall be connected to the concrete-encased electrode by welding, exothermic welding, steel tie wires, or other approved means.

(3) A rebar-type concrete-encased electrode installed in accordance with 250.52(A)(3) with an additional rebar section extended from its location within the concrete foundation or footing to an accessible location that is not subject to corrosion shall be permitted for connection of grounding electrode conductors and bonding jumpers in accordance with the following:

a. The additional rebar section shall be continuous with the grounding electrode rebar or shall be connected to the grounding electrode rebar and connected together by steel tie wires, exothermic welding, welding, or other effective means.

b. The rebar extension shall not be exposed to contact with the earth without corrosion protection.

c. Rebar shall not be used as a conductor to interconnect the electrodes of grounding electrode systems.

250.70 Methods of Grounding and Bonding Conductor Connection to Electrodes.

(A) General.

The grounding or bonding conductor shall be connected to the grounding electrode by exothermic welding, listed lugs, listed pressure connectors, listed clamps, or other listed means. Connections depending on solder shall not be used. Ground clamps shall be listed for the materials of the grounding electrode and the grounding electrode conductor and, if used on pipe, rod, or other buried electrodes, shall also be listed for direct soil burial or concrete encasement. Not more than one conductor shall be connected to the grounding electrode by a single clamp or fitting unless the clamp or fitting is listed for multiple conductors.

(B) Indoor Communications Systems.

For indoor communications purposes only, a listed sheet metal strap-type ground clamp having a rigid metal base that seats on the electrode and having a strap of such material and dimensions that it is not likely to stretch during or after installation shall be permitted.

250.94 Bonding for Communications Systems.

Communication system bonding conductor terminations shall be connected in accordance with 250.94(A) or (B).

(A) The Intersystem Bonding Termination Device.

An intersystem bonding termination (IBT) for connecting intersystem bonding conductors shall be provided external to enclosures at the service equipment or metering equipment enclosure and at the disconnecting means for any buildings or structures that are supplied by a feeder or branch circuit. If an IBT is used, it shall comply with the following:

(1) Be accessible for connection and inspection

(2) Consist of a set of terminals with the capacity for connection of not less than three intersystem bonding conductors

(3) Not interfere with opening the enclosure for a service, building or structure disconnecting means, or metering equipment

(4) Be securely mounted as follows:

a. At the service equipment, to a metal enclosure for the service equipment, to a metal meter enclosure, or to an exposed nonflexible metal service raceway, or be connected to the metal enclosure for the grounding electrode conductor with a minimum 6 AWG copper conductor

b. At the disconnecting means for a building or structure that is supplied by a feeder or branch circuit, be electrically connected to the metal enclosure for the building or structure disconnecting means, or be connected to the metal enclosure for the grounding electrode conductor with a minimum 6 AWG copper conductor

(5) Be listed as grounding and bonding equipment

Exception:

In existing buildings or structures, if any of the intersystem bonding and grounding electrode conductors required by 770.100(B)(2), 800.100(B)(2), 810.21(F)(2), and 820.100 exist, installation of an IBT shall not be required. An accessible means external to enclosures for connecting intersystem bonding and grounding electrode conductors shall be permitted at the service equipment and at the disconnecting means for any buildings or structures that are supplied by a feeder or branch circuit by at least one of the following means:

(1) Exposed nonflexible metal raceways

(2) An exposed grounding electrode conductor

(3) Approved means for the external connection of a copper or other corrosion-resistant bonding or grounding electrode conductor to the grounded raceway or equipment

(B) Other Means.

Connections to an aluminum or copper busbar not less than 6 mm thick × 50 mm wide (1⁄4 in. thick × 2 in. wide) and of a length to accommodate at least three terminations for communication systems in addition to other connections. The busbar shall be securely fastened and shall be installed in an accessible location. Connections shall be made by a listed connector. If aluminum busbars are used, the installation shall also comply with 250.64(A). The busbar shall be connected to the grounding electrode system by a conductor that is the larger of the following:

(1) The largest grounding electrode conductor that is connected to the busbar

(2) As required or permitted in 250.94(A)

Exception to (A) and (B):

Means for connecting intersystem bonding conductors are not required if communications systems are not likely to be used in or on the building or structure.

300.4 (G) Fittings

Where raceways contain 4 AWG or larger insulated circuit conductors, and these conductors enter a cabinet, a box, an enclosure, or a raceway, the conductors shall be protected in accordance with any of the following:
(1) An identified fitting providing a smoothly rounded insulating surface
(2) A listed metal fitting that has smoothly rounded edges
(3) Separation from the fitting or raceway using an identified insulating material that is securely fastened in place
(4) Threaded hubs or bosses that are an integral part of a cabinet, box, enclosure, or raceway providing a smoothly rounded or flared entry for conductors

300.7 (A) Sealing

Where portions of a raceway or sleeve are known to be subjected to different temperatures, and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building, the raceway or sleeve shall be filled with an approved material to prevent the circulation of warm air to a colder section of the raceway or sleeve. An explosion proof seal shall not be required for this purpose.

310.12 Single-Phase Dwelling Services and Feeders.

For one-family dwellings and the individual dwelling units of two-family and multifamily dwellings, service and feeder conductors supplied by a single-phase, 120/240-volt system shall be permitted to be sized in accordance with 310.12(A) through (D).
For one-family dwellings and the individual dwelling units of two-family and multifamily dwellings, single-phase feeder conductors consisting of two ungrounded conductors and the neutral conductor from a 208Y/120 volt system shall be permitted to be sized in accordance with 310.12(A) through (C).

(A) Services.

For a service rated 100 amperes through 400 amperes, the service conductors supplying the entire load associated with a one-family dwelling, or the service conductors supplying the entire load associated with an individual dwelling unit in a two-family or multifamily dwelling, shall be permitted to have an ampacity not less than 83 percent of the service rating. If no adjustment or correction factors are required, Table 310.12(A) shall be permitted to be applied.

(B) Feeders.

For a feeder rated 100 amperes through 400 amperes, the feeder conductors supplying the entire load associated with a one-family dwelling, or the feeder conductors supplying the entire load associated with an individual dwelling unit in a two-family or multifamily dwelling, shall be permitted to have an ampacity not less than 83 percent of the feeder rating. If no adjustment or correction factors are required, Table 310.12(A) shall be permitted to be applied.

(C) Feeder Ampacities.

In no case shall a feeder for an individual dwelling unit be required to have an ampacity greater than that specified in 310.12(A) or (B).

(D) Grounded Conductors.

Grounded conductors shall be permitted to be sized smaller than the ungrounded conductors, if the requirements of 220.61 and 230.42 for service conductors or the requirements of 215.2 and 220.61 for feeder conductors are met.
Where correction or adjustment factors are required by 310.15(B) or (C), they shall be permitted to be applied to the ampacity associated with the temperature rating of the conductor.

310.15 Ampacity Tables.

(A) General.

Ampacities for conductors rated 0 volts to 2000 volts shall be as specified in the Ampacity Table 310.16 through Table 310.21, as modified by 310.15(A) through (F) and 310.12. Under engineering supervision, ampacities of sizes not shown in ampacity tables for conductors meeting the general wiring requirements shall be permitted to be determined by interpolation of the adjacent conductors based on the conductor's circular-mil area.

The temperature correction and adjustment factors shall be permitted to be applied to the ampacity for the temperature rating of the conductor, if the corrected and adjusted ampacity does not exceed the ampacity for the temperature rating of the termination in accordance with 110.14(C).

312.2 Damp and Wet Locations.

In damp or wet locations, surface-type enclosures within the scope of this article shall be placed or equipped so as to prevent moisture or water from entering and accumulating within the cabinet or cutout box, and shall be mounted so there is at least $^1/_4$-in. airspace between the enclosure and the wall or other supporting surface. Enclosures installed in wet locations shall be weatherproof. For enclosures in wet locations, raceways or cables entering above the level of uninsulated live parts shall use fittings listed for wet locations.

Exception: Nonmetallic enclosures shall be permitted to be installed without the airspace on a concrete, masonry, tile, or similar surface.

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 $^1/_8$ in. and not larger than $^1/_4$ in. in diameter shall be permitted to be installed in the field in 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.

334.30 Securing and Supporting.

Nonmetallic-sheathed cable shall be supported and secured by staples, cable ties listed and identified for securement and support, or straps, hangers, or similar fittings designed and installed so as not to damage the cable, at intervals not exceeding 4 ½ ft. and within 12 in. of every cable entry into enclosures such as outlet boxes, junction boxes, cabinets, or fittings. The cable length between the cable entry and the closest cable support shall not exceed 18 in. Flat cables shall not be stapled on edge.

352.30 Securing and Supporting.

PVC conduit shall be installed as a complete system as provided in 300.20 and shall be fastened so that movement from thermal expansion or contraction is permitted. PVC conduit shall be securely fastened and supported in accordance with 352.30(A) and 352.30(B).

(A) Securely Fastened.

PVC conduit shall be securely fastened within 900 mm (3 ft) of each outlet box, junction box, device box, conduit body, or other conduit termination. Conduit listed for securing at other than 900 mm (3 ft) shall be permitted in accordance with the listing.

406.6 Receptacle Faceplates (Cover Plates).

Receptacle faceplates shall be installed so as to completely cover the opening and seat against the mounting surface.

Receptacle faceplates mounted inside a box having a recess-mounted receptacle shall effectively close the opening and seat against the mounting surface.

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 125- and 250-volt nonlocking receptacles shall be a listed weather-resistant type. Hinged covers of outlet box hoods shall be able to open at least 90 degrees, or fully open if the cover is not designed to open 90 degrees from the closed to open position, after installation.

(B) Wet Locations.

(1) Receptacles of 15 Amperes and 20 Amperes in a Wet Location.

Receptacles of 15 amperes and 20 amperes, 125 volts 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 identified extra duty. Hinged covers of outlet box hoods shall be able to open at least 90 degrees, or fully open if the cover is not designed to open 90 degrees from the closed to open position, after installation.

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.

(2) Other Receptacles.

All other receptacles installed in a wet location shall be listed weather-resistant type, and installation shall comply with 406.9(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.

(C) Bathtub and Shower Space.

Receptacles shall not be installed inside of the tub or shower or within a zone measured 900 mm (3 ft) horizontally from any outside edge of the bathtub or shower stall, including the space outside the bathtub or shower stall space below the zone.

The zone also includes the space measured vertically from the floor to 2.5 m (8 ft) above the top of the bathtub rim or shower stall threshold. The identified zone is all-encompassing and shall include the space directly over the bathtub or shower stall and the space below this zone, but not the space separated by a floor, wall, ceiling, room door, window, or fixed barrier.

Exception No. 1:

Receptacles installed in accordance with 680.73 shall be permitted.

Exception No. 2:

In bathrooms with less than the required zone, the receptacle(s) required by 210.52(D) shall be permitted to be installed opposite the bathtub rim or shower stall threshold on the farthest wall within the room.

Exception No. 3:

Weight supporting ceiling receptacles (WSCR) shall be permitted to be installed for listed luminaires that employ a weight supporting attachment fitting (WSAF) in damp locations complying with 410.10(D).
Exception No. 4:
In a dwelling unit, a single receptacle shall be permitted for an electronic toilet or personal hygiene device such as an electronic bidet seat. The receptacle shall be readily accessible and not located in the space between the toilet and the bathtub or shower.

(D) Flush Mounting with Faceplate.

The enclosure for a receptacle installed in an outlet box flush-mounted in a finished surface shall be made weatherproof by means of a weatherproof faceplate assembly that provides a watertight connection between the plate and the finished surface.

408.4 Descriptions Required.

(A) Circuit Directory or Circuit Description.

Every circuit and circuit modification shall be provided with a legible and permanent description that complies with all of the following conditions as applicable:
(1) Located at each switch or circuit breaker in a switchboard or switchgear
(2) Included in a circuit directory that is located on the face of, inside of, or in an approved location adjacent to the panel door in the case of a panelboard
(3) Clear, evident, and specific to the purpose or use of each circuit including spare positions with an unused overcurrent device
(4) Described with a degree of detail and clarity that is unlikely to result in confusion between circuits
(5) Not dependent on transient conditions of occupancy
(6) Clear in explaining abbreviations and symbols when used

408.7 Unused Openings.

Unused openings for circuit breakers and switches shall be closed using identified closures, or other approved means that provide protection substantially equivalent to the wall of the enclosure.

Questions and clarifications

Following are questions asked to the Building official and the answers provided constitute policy of ACBD.

Q. Do roads need to be competed for a semi perm?
A. Not specifically, there must be clear access for the utility and emergency services, but a paved road is not required.

Q. How long does it take from the inspection being passed until a meter is installed?
A. That is out of our control. Typically our staff reports the results to the utility within 24-48 hours, beyond that depends on the utility and their workload.