



National Electric Code (NEC)

Branch Circuits

210.8 – Ground-fault circuit interrupter protection for personnel

Ground-fault circuit interruption for personnel shall be provided as required in 210.8(A) through (C). The ground-fault circuit interrupter shall be installed in a readily accessible location.

422.49 – High-pressure spray washers

All single-phase cord-and-plug connected high-pressure spray washing machines rated at 250 volts or less shall be provided with factory-installed ground-fault circuit interrupter protection for personnel. The ground-fault circuit interrupter shall be an integral part of the attachment plug or shall be located within 300mm (12 in.) of the attachment plug.

Electrical Appliances

422.51 – Cord-and-plug connected vending machines

Cord-and-plug connected vending machines manufactured or re-manufactured on or after January 1, 2005, shall include a ground-fault circuit interrupter as an integral part of the attachment plug or be located within 300mm (12 in.) of the attachment plug. Older vending machines manufactured or re-manufactured prior to January 1, 2005, shall be connected to a GFCI-protected outlet.

Fixed electric space-heating equipment

424.44 (G) – Installation of cables in concrete or poured masonry floors

Ground-fault circuit interrupter protection. Ground-fault circuit interrupter protection for personnel shall be provided for cables installed in electrically heated floors of bathrooms, kitchens, and in hydro-massage bathtub locations.

Fixed outdoor electric deicing and snow-melting equipment

426.28 – Ground-fault protection of equipment

Ground-fault protection of equipment shall be provided for fixed outdoor electric deicing and snow-melting equipment.

Fixed Electric Heating Equipment for Pipelines and Vessels

427.22 – Ground-fault protection of equipment

Ground-fault protection of equipment shall be provided for electric heat tracing and heating panels. This requirement shall not apply in industrial establishments where there is alarm indication of ground faults and the following conditions apply:

- (1) Conditions of maintenance and supervision ensure that only qualified persons service the installed systems.
- (2) Continued circuit operation is necessary for safe operation of equipment or processes.

Commercial Garages, Repair, and Storage

511.12 – Ground-fault circuit interrupter protection for personnel

All 125-volt, single-phase, 15- and 20-ampere receptacles installed in areas where electrical diagnostic equipment, electrical hand tools, or portable lighting equipment are to be used shall have ground-fault circuit interrupter protection for personnel.

Aircraft Hangers

513.12 – Ground-fault circuit interrupter protection for personnel

All 125-volt, 50/60Hz, single-phase, 15- and 20-ampere receptacles installed in areas where electrical diagnostic equipment, electrical hand tools, or portable lighting equipment are to be used shall have ground-fault circuit interrupter protection for personnel.



Health Care Facilities

517.17 – Ground-fault protection

- (A) **Applicability.** The requirements of 517.17 shall apply to hospitals and other buildings (including multiple-occupancy buildings) with critical care areas or utilizing electrical life-support equipment, and buildings that provide the required essential utilities or services for the operation of critical care areas or electrical life-support equipment.
- (B) **Feeders.** Where ground-fault protection is provided for operation of the service disconnecting means or feeder disconnecting means as specified by 230.95 or 215.10, an additional step of ground-fault protection shall be provided in all next level feeder disconnecting means downstream toward the load. Such protection shall consist of overcurrent devices and current transformers or other equivalent protective equipment that shall cause the feeder disconnecting means to open.
The additional levels of ground-fault protection shall not be installed on the load side of an essential electrical system transfer switch.
- (C) **Selectivity.** Ground-fault protection for operation of the service and feeder disconnecting means shall be fully selective such that the feeder device, but not the service device, shall open on ground faults on the load side of the feeder device. Separation of ground-fault protection time-current characteristics shall conform to manufacturer's recommendations and shall consider all required tolerances and disconnect operating time to achieve 100 percent selectivity.
- (D) **Testing.** When equipment ground-fault protection is first installed, each level shall be performance tested to ensure compliance with 517.17(C).

517.20 (A) – Wet procedure location

- (A) **Receptacles and fixed equipment.** Wet procedure location patient care areas shall be provided with special protection against electric shock by one of the following means:
- (1) Power distribution system that inherently limits the possible ground-fault current due to a first fault to a low value, without interrupting the power supply
 - (2) Power distribution system in which the power supply is interrupted if the ground-fault current does, in fact, exceed a value of 6mA

517.21 – Ground-fault circuit interrupter protection for personnel

Ground-fault circuit interrupter protection for personnel shall not be required for receptacles installed in those critical care areas where the toilet and basin are installed within the patient room.

Carnivals, Circuses, Fairs, and Similar Events

525.23 – Ground-fault circuit interrupter protection

- (A) **Where GFCI protection is required.** GFCI protection for personnel shall be provided for the following:
- (1) All 125-volt, single-phase, 15- and 20-ampere non-locking-type receptacles used for disassembly and reassembly or readily accessible to the general public
 - (2) Equipment that is readily accessible to the general public and supplies from a 125-volt, single-phase, 15- or 20-ampere branch circuit

The ground-fault circuit interrupter shall be permitted to be an integral part of the attachment plug or located in the power-supply cord within 300mm (12 inch.) of the attachment plug. Listed cord sets incorporating ground-fault circuit interrupter for personnel shall be permitted.

Recreational Vehicles and Recreational Vehicle Parks

551.40 – 120-volt or 120/240-volt, nominal, systems

- (C) **Ground-fault circuit interrupter protection.** The internal wiring of a recreational vehicle having only one 15- or 20-ampere branch circuit as permitted in 551.42(A) and (B) shall have ground-fault circuit interrupter protection for personnel. The ground-fault circuit interrupter shall be installed at the point where the power supply assembly terminates within the recreational vehicle. Where a separable cord set is not employed, the ground-fault circuit interrupter shall be permitted to be an integral part of the attachment plug of the power supply assembly. The ground-fault circuit interrupter shall provide protection also under the conditions of an open grounded circuit conductor, interchanged circuit conductors, or both.



Marinas and Boatyards

555.19 (B) – Receptacles other than Shore Power

- (1) **Ground-fault circuit interrupter protection for personnel.** 15- and 20-ampere, single-phase, 125-volt receptacles installed outdoors, in boathouses, in buildings or structures used for storage, maintenance, or repair where portable electrical hand tools, electrical diagnostic equipment, or portable lighting equipment are to be used shall be provided with GFCI protection for personnel. Receptacles in other locations shall be protected in accordance with 210.8(B)

555.3 Marinas – Ground Fault Protection

Main overcurrent protective device feeding the marina:

Required to have Ground Fault Protection of Equipment (GFPE)

GFPE level shall not exceed 100mA

GFPE protection of each individual feeder or branch circuit is permitted as an alternative

GFCI protection is still required for receptacles in accordance with 555.29(B)(1)

Temporary Installations

590.6 – Ground-fault protection for personnel

Ground-fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) and (B). This section shall apply only to temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance repair, or demolition of buildings, structures, equipment, or similar activities. This section shall apply to power derived from an electric utility company or from an on-site-generated power source.

Electric Signs and Outline Lightening

600.10 – Portable or mobile signs

(C) **Wet or damp location.** Portable or mobile signs in wet or damp locations shall comply with 600.10(C)(1) and (C)(2).

- (2) **Ground-fault circuit interrupter.** Portable or mobile signs shall be provided with factory-installed ground-fault circuit interrupter protection for personnel. The ground-fault circuit interrupter shall be an integral part of the attachment plug or shall be located in the power-supply cord within 300mm (12 inch.) of the attachment plug.

Electric Vehicle Charging Systems

625 - Electric Vehicle Charging and Supply Equipment Systems

The provisions of this article cover the electrical conductors and equipment external to an electric vehicle that connect an electric vehicle to a supply of electricity by conductive or inductive means, and the installation of equipment and devices related to electric vehicle charging.

Note UL 2594-2011, Standard for Electric Vehicle Supply Equipment, is a safety standard for Electric Vehicle Supply Equipment. UL 2202-2009, Standard for Electric Vehicle Charging System Equipment, is a safety standard for Electric Vehicle Charging Equipment.

Electrified Truck Parking Spaces (TSE)

626.24 (D) – Ground-fault circuit interrupter protection for personnel

The electrified truck parking space equipment shall be designed and constructed such that all receptacle outlets in 626.24 are provided with ground-fault circuit interrupter protection for personnel.



Swimming Pools, Fountains, and Similar Installation

680.22 – Lighting, receptacles, and equipment (Pools)

(A)(4) GFCI protection. All 15- and 20-ampere, single-phase, 125-volt receptacles located within 6.0m (20ft) of the inside walls of a pool shall be protected by a ground-fault circuit interrupter.

(B) Luminaires, lighting outlets, and ceiling-suspended (paddle) fans.

(4) GFCI protection in adjacent areas. Luminaires, lighting outlets, and ceiling-suspended (paddle) fans installed in the area extending between 1.5m (5ft) and 3.0m (10ft) horizontally from the inside walls of a pool shall be protected by a ground-fault circuit interrupter unless installed not less than 1.5m (5ft) above the maximum water level and rigidly attached to the structure adjacent to or enclosing the pool.

680.32 – Ground-fault circuit interrupters required (Storable Pools)

All electrical equipment, including power-supply cords, used with storable pools shall be protected by ground-fault circuit interrupters.

All 125-volt, 15- and 20-ampere receptacles located within 6.0m (20ft) of the inside walls of storable pool shall be protected by a ground-fault circuit interrupter. In determining these dimensions, the distance to be measured shall be the shortest path the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.

680.43 – Indoor installation (Spa or Hot Tub)

A spa or hot tub installed indoors shall comply with the provisions of Parts I and II of this article except as modified by the section and shall be connected by the wiring methods of Chapter 3

(A) Receptacles. At least one 125-volt, 15- or 20-ampere receptacle on a general purpose branch circuit shall be located not less than 1.83m (6ft) from, and not exceeding 3.0m (10ft) from, the inside wall of the spa or hot tub.

680.44 – Protection (Spa or Hot Tub)

Except as otherwise provided in this section, the outlet(s) that supplies a self-contained spa or hot tub, a packaged spa or hot tub equipment assembly, or a field assembled spa or hot tub shall be protected by a ground-fault circuit interrupter.

(A) Listed units. If so marked, a listed self-contained unit or listed packaged equipment assembly that includes integral ground-fault circuit interrupter protection for all electrical parts within the unit or assembly (pumps, air blowers, heaters, lights, controls, sanitizer generators, wiring, and so forth) shall be permitted without additional GFCI protection.

(B) Other units. A field-assembled spa or hot tub rated 3 phase or rated over 250-volts or with a heater load of more than 50 amperes shall not require the supply to be protected by a ground-fault circuit interrupter.

680.50 – General (Fountains)

The provisions of Part I and Part V of this article shall apply to all permanently installed fountains as defined in 680.2.

Fountains that have water common to a pool shall additionally comply with the requirements in Part II of this article. Part V does not cover self-contained, portable fountains. Portable fountains shall comply with Parts II and III of Article 422.

680.51 – Luminaires, submersible pumps, and other submersible equipment (Fountains)

(A) Ground-fault circuit interrupters. Luminaires, submersible pumps, and other submersible equipment, unless listed for operation at low voltage contact limit or less and supplied by a transformer or power supply that complies with 680.23(A)(2), shall be protected by a ground-fault circuit interrupter.

680.57 – Signs (Fountains)

(B) Ground-fault circuit protection for personnel. All circuits supplying the sign shall have ground-fault circuit interrupter protection for personnel.

680.58 – GFCI protection for adjacent receptacle outlets (Fountains)

All 15- or 20-ampere, single-phase 125-volt through 250-volt receptacles located within 6.0m (20ft) of a fountain edge shall be provided with GFCI protection.



680.60 – General (Therapeutic Pools and Tubs)

The provisions of Part 1 and Part VI of this article shall apply to pools and tubs for therapeutic use in health care facilities, gymnasiums, athletic training rooms, and similar areas. Portable and therapeutic appliances shall comply with Parts II and III of Article 422.

680.62 E – Receptacles (Therapeutic Pools and Tubs)

Receptacles within 1.83m (6ft) of a therapeutic tub shall be protected by a ground-fault circuit interrupter.