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**Note: This article is based on the 2023 NEC.**

### Do you know the specific locations where GFCI and AFCI protection are required?

A ground fault interrupter (GFCI) protects people from shock, while an arc fault interrupter (AFCI) protects people from fires that could result from electrical arcing of wiring inside walls. Following the NEC rules will optimize protection, while noncompliance could prove fatal to occupants.

### GFCI protection for dwellings

GFCI protection must be provided as required in 210.8(A) through (F). GFCI protective devices must be in a readily accessible location.

You can provide the GFCI protection using either a GFCI circuit breaker or a GFCI receptacle. To apply 210.8(A)(8) or (10), 210.8(B)(7), (13), and (15), the distance you measure from the sink or bathtub/shower is the shortest path the power-supply cord connected to the receptacle will follow without piercing a floor, wall, ceiling, or fixed barrier.

With the 2023 revision, the reference to windows and doors was removed to ensure GFCI protection for receptacles within the measured distance as required in 210.8 even if the measurement line passes through a window or door.

A GFCI circuit breaker provides ground-fault protection starting at the breaker, so the entire circuit has ground-fault protection. A GFCI receptacle provides ground-fault protection for whatever is plugged into it; it has load-side terminals that provide downstream protection for any other receptacle(s) or device(s) on the circuit.

Receptacles installed in the following dwelling unit locations must be GFCI protected (and the GFCI device must be in a readily accessible location) [210.8]. **Figure 01**

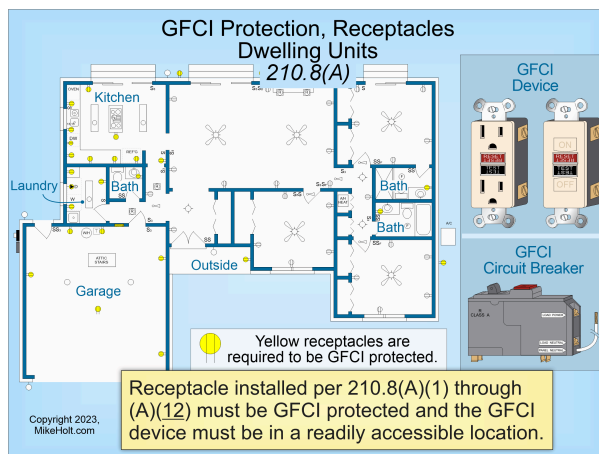
- (1) Bathrooms.
- (2) Garages and accessory buildings.
- (3) Outdoors.
- (4) Crawl spaces (at or below grade).
- (5) Basements.
- (6) Kitchens.

Traditionally this requirement applied only to kitchen countertop receptacles, but now any cord-and-plug-connected appliance in the kitchen such as the range receptacle, refrigerator receptacle, disposal receptacle, and microwave receptacle now require GFCI protection.

- (7) Food or beverage preparation or cooking areas.
- (8) Sinks (receptacles within 6 ft of the top inside edge of the bowl of a dwelling unit sink).
- (9) Boathouses.

The Code does not require installing a receptacle in a boathouse, but any that are in a boathouse must be GFCI protected.

- (10) Bathtubs or shower stalls (receptacles within 6 ft of the outside edge of a bathtub or shower stall not installed within a bathroom).



**Figure 01**

- (11) Laundry areas.
- (12) Damp and Wet Locations Indoors.

*Ex 1: GFCI protection is not required for a receptacle dedicated to fixed electric snow-melting equipment if the receptacle is not readily accessible and ground-fault protection of equipment (GFPE) is provided as required by 426.28 and 427.22.*

*Ex 2: GFCI protection is not required for a receptacle supplying only a permanently installed premises security system.*

*Ex 4: GFCI protection is not required for receptacles in dwelling unit bathroom exhaust fans, unless specified by the fan instructions.*

The receptacle for exhaust fans is internal to the exhaust fan. They are not accessible as a convenience cord-and-plug receptacle, therefore GFCI protection is not required. Per UL Guide Information GPWX, exhaust fans installed in the area directly above the footprint (width and depth of the equipment) of the bathtub or shower must be GFCI protected.

### **GFCI protection for other than dwellings**

GFCI protection is required for 125V through 250V receptacles supplied by single-phase branch circuits 50A (or less) or three-phase branch circuits 100A (or less) installed in the following locations [210.8(B)]:

- (1) Bathrooms.
  - (2) Kitchens.
  - (3) Food or beverage preparation or cooking areas.
  - (4) Buffet serving areas (if they have permanent provisions for food serving, beverage serving, or cooking).
- This requires GFCI protection for receptacles in the break area of a commercial occupancy.
- (5) Rooftops.
  - (6) Outdoors.
  - (7) Sinks (for cord-and-plug-connected fixed or stationary appliances within 6 ft from the top inside edge of the bowl of a sink).
- Note that a faulted appliance in proximity to sinks presents a shock hazard whether the receptacle is within 6 feet or not.
- (8) Indoor damp or wet locations.
  - (9) Locker rooms.
  - (10) Garages, accessory buildings, and similar areas.
  - (11) Crawl spaces (at or below grade).
  - (12) Unfinished areas of basements.
  - (13) Aquatic tanks or bowls (receptacles within 6 ft from the top inside edge or rim, and receptacles within 6 ft from the conductive support framing of the container for aquariums, bait wells, and similar open aquatic containers such as tanks or bowls).
  - (14) Laundry areas.
  - (15) Bathtubs and shower stalls (receptacles within 6 ft of the outside edge of a bathtub or shower stall not installed in a bathroom).

*Ex 2: Rooftop GFCI receptacles are required to be readily accessible only from the rooftop itself.*

GFCI protection is also required for:

- 20V lighting outlets in crawl spaces [210.8(C)]. A lighting outlet is not required for a dwelling unit crawl space unless the space is used for storage or has equipment requiring servicing [210.70(C)].
- Appliances rated 150V or less to ground, rated 60A or less, single- or three-phase, either cord-and-plug or hardwired connected. A dozen of these are listed in [210.8(D)].

They include vending machines, sump pumps, and electric ranges. Some appliances listed in 210.8(D) may be hardwired instead of cord-and-plug connected, but the GFCI protection requirements of 210.8(A) and (B) apply only to receptacles. So why are these also required to be GFCI protected? Because the shock hazards exist whether appliances are hardwired or cord-and-plug connected. Provide GFCI protection for the appliance branch circuit or outlet, either way.

- Equipment requiring servicing [210.8(E)]. This includes the 125V, 15A or 20A service receptacle outlet installed within 25 ft of the air-conditioning equipment as required in 210.63(A) or indoor service equipment as required in 210.63(B).
- All outdoor outlets rated 50A or less located outside a dwelling and outside garages, accessory buildings, or boathouses of dwelling spaces.

If equipment connected to any of the above outdoor outlets is replaced, the circuit to the outlet must be GFCI protected.

*Ex 2: GFCI protection is not required for listed HVAC equipment, such as motor compressors or heat pumps.*