Meeting Minutes: NEC 2020 Adoption Review Committee of the Board of Electricity

Date: October 8, 2019
Time: 8:00 a.m.
Location: Minnesota Room, Department of Labor and Industry
443 Lafayette Road North, St. Paul, MN 55155

Committee Members Present:
Cole Funseth
Michael Hanson
Duane Hendricks
Chad Kurdi
Peter Lindahl
Daniel Westberg – Chair

DLI Staff & Visitors:
Jeff Lebowski (Gen. Counsel, DLI)
Dean Hunter (DLI)
Steve Dudley (DLI)
Gary Kruse (State of WI)
Gary Thaden (NECA)

Committee Members Absent:
None

Board Members Present:
John Williamson
Scott Novotny

1. Call to Order

The meeting was called to order at 8:00 a.m. by Chair Westberg. Roll call was taken by Secretary Hendricks and a quorum was declared with 5 of 6 voting members – Cole Funseth joined the meeting late resulting in 6 of 6 voting members present in person.

2. Approval of Meeting Agenda

A motion was made by Hanson, seconded by Kurdi, to approve the agenda as presented. The vote was unanimous with 5 votes in favor of the motion; the motion carried**.**

3. Approval of previous meeting minutes

A motion was made by Kurdi, seconded by Hanson, to approve the Sept. 12, 2019, meeting minutes as presented. The vote was unanimous with 5 votes in favor of the motion; the motion carried**.**

4. Regular Business

a. **Expense Approval** – reviewed and approved the per diem and expenses.

Cole Funseth joined the meeting at 8:07 a.m. resulting in 6 of 6 Committee members present.

5. Special Business

a. NEC adoption – Attachment A

Review by the NEC Committee continued of Items 1-53, with special emphasis on Item numbers 5, 15, and 20, of Attachment A related to residential GFCI requirements.

Dean Hunter referred to the International Association of Electrical Inspectors (IAEI) Analysis of Changes contained in the attachment and clarified that, although discussed at the previous meeting, luminaires were not to be included in the new GFCI requirements for outdoor outlets in National Electrical Code Section 210.8(F).

Hendricks said he read through the analysis and there was a lot of discussion of items 5, 15, and 20 and about the basement being all GFCI. He believes all of these are legitimately necessary. And added that the analysis says that if there is water or moisture in the basement it is a safety concern.

Hanson said part of what was discussed at the last meeting was that there shouldn't be changes to codes without ample justification; however, item #5 of Attachment A might possibly create a greater hazard for homeowners since instead of following the new code provisions, contractors might begin hard-wiring dryers and ranges and when a homeowner needs to unclog a dryer exhaust vent, they can no longer unplug the dryer attachment cord from a receptacle since the dryer is hard-wired. The option to hard-wire the appliances could create an unintended or greater hazard.

Hanson referred to item #15 and said he still questions the practical nature of the GFCI on air conditioning units. If people follow the code and install properly, then he struggles to see the need and the expense. He believes the hazard doesn't justify the expense and there will be a lot of electrical "tripping" issues with these condensers. He is fine with the basement receptacle – he doesn't have any objection to item #20. He believes the Committee should review item #5 – it isn't as if every existing home/dwelling unit is wired in accordance with the current code.

Lindahl said he isn't interested in adding costs to wired units, but he believes that in many cases the contractor is not going to return. In many cases he would think the contractor would put the receptacle in, so they don't have to return.

Kurdi said he has concerns with nuisance tripping. The challenge is when the equipment is hard-wired, would the leakage-current threshold be low enough to allow the GFCI to continue to operate – specifically air conditioning units. He can see this becoming a hazard in the future because homeowners will take it upon themselves to remove the GFCI breaker. However, he clarified that he didn't feel the code needed to be amended and that this could be reviewed during the next 2023 NEC code cycle, if necessary.

Lebowski reminded the Committee that the Board could adopt the 2020 NEC code as is and do rulemaking afterwards if there were issues that needed to be addressed. In addition, he added that the Board could also address any unintended issues by opening

emergency rulemaking to fix any code issues and that the Board also has interpretive authority to fine-tune the code on a case-by-case basis, if necessary. Therefore, the Board would not have to wait until the next code cycle to address any issues with adopting the 2020 NEC without Minnesota Amendments.

The Chair said it appears that all are prepared to make a motion on item #20.

A motion was made by Kurdi, seconded by Hanson, to accept item #20 – 210.8(A)(5) ALL dwelling unit basements. The vote was unanimous with 6 votes in favor of the motion; the motion carried.

Williamson said that there are currently 3 code interpretations on the Board of Electricity's webpage, and he reiterated Lebowski's comments that the Board has final interpretative authority. The Board's Final Interpretations can be viewed here: http://www.dli.mn.gov/about-department/boards-and-councils/board-electricity

A motion was made by Lindahl, seconded by Hendricks, to accept items #5 – 210.8(A) 250-volt receptacles and #15 – 210.8(F) GFCI Outdoor Outlets at Dwelling Units. The vote was unanimous with 6 votes in favor of the motion; the motion carried.

Hendricks said he would brief the Board on the NEC's rulemaking recommendation.

Kurdi asked if the Committee needed to review costs associated with these recommendations and Williamson said a cost analysis will be completed but hasn't been yet. Hendricks asked if a certain threshold needed to be met regarding costs and Lebowski said yes and no. The Committee must be concerned with costs in general; however, in the Statute there must be a specific statement as to what affect rulemaking will have on small businesses and small cities. Small business is classified as less than 50 employees and small cities as less than 10 employees. There are also general requirements – what was the overall impact and a cost analysis needs to be completed. He doesn't think there are any red flags that costs will be outrageous, but this should be discussed at the Board meeting to the best of the Committee's abilities.

6. Announcements

7. Adjournment

A motion was made by Lindahl, seconded Hanson, to adjourn the meeting at 8:21 a.m. The vote was unanimous with 6 votes in favor of the motion; the motion carried.

Respectfully Submitted,

Dan Westberg

Dan Westberg
Board/NEC Committee Chair

2020 NEC Changes Review:

1. Article 242 Overvoltage Protection
2. Article 311 Medium Voltage Conductors and Cables
3. Article 337 “Type P Cable”
4. (New) Article 800 General Requirements for Communications Systems
5. 210.8(A) 250-volt receptacles
6. 90.2(A)(5) and (6) Scope of *NEC*
7. 555.35(A)(1) Receptacles Providing Shore Power
8. 555.35(A)(3) Feeders and Branch Circuits with GFPE
9. 680.2 and 680.50 Splash Pads
10. 230.71(B) Two to Six Service Disconnects
11. 110.26(C)(2) Open Equipment Doors
12. 408.18(C)(2) Grounded Circuit Conductors
13. 314.16(B)(5) Volume Allowance for EGCs
14. Section 310.1 Scope *(Rewrite of Article 310)*
15. 210.8(F) GFCI Outdoor Outlets at Dwelling Units
16. 690.12(B)(2) Inside the Array Boundary
17. Article 100 Definition: Labeled. New I-Note added *(smallest package)*
18. 230.85 Emergency Disconnects at Dwelling Units
19. 705.13 Power Control Systems
20. 210.8(A)(5) ALL dwelling unit basements
21. 250.64 Aluminum and Copper-Clad Aluminum Conductors
22. 406.9(C) Bathtub or Shower Stall Restricted “Zone” for Receptacles
23. Article 100 Fault Current, Fault Current, Available
24. 210.8(B) New GFCI requirements were added for (6) damp locations, (8) accessory buildings, (11) laundry areas, and (12) bathtubs and shower stalls
25. 310.12 and Table 310.12 New Dwelling Unit Table
26. 210.52(C)(2) Countertops and Work Surfaces
27. 408.43 Panelboard Orientation
28. 220.12 and Table 220.12 Section 220.12 and Table 220.12 Extensively Revised
29. 690.41(B) Ground-Fault Protection
30. 210.8 GFCI Protection for Personnel *(Removal of “door” and “doorway”)*
31. 110.14(D) Terminal Connection Torque
32. 555.13 Bonding of Non-Current-Carrying Metal Parts
33. Article 100 Reconditioned
34. 210.15 Reconditioned Equipment
35. 551.71(A) 20-Ampere (RV site supply)
36. 450.9 Ventilation *(prohibit storage on top)*
37. 230.67 Surge Protection at Dwelling Units
38. 690.33 Mating Connectors
39. 110.12(C) Cables and Conductors *(Relocate .24 from Chapters 7 and 8)*
40. 250.68(C)(3) GEC Connections

41. 110.26(C)(3) Personnel Doors
42. 230.62(C) Barriers
43. 312.8(B) Power Monitoring or Energy Management
44. 200.10(B) Identification of Terminals
45. 430.7(A) Usual Motor Applications
46. 220.42 General Lighting
47. 240.67(C)/240.87(C) Performance Testing
48. 690.41(B)(3) Indication of Faults
49. 230.46 Splices and Tapped Conductors
50. 410.170 and 410.188 Horticultural Lighting
51. 547.5(G) 15-20A GFCI Receptacles in an AG building
52. 547.9 AG Distribution Point
53. 547.9 (C) AG Underground feeders from a distribution point

Others

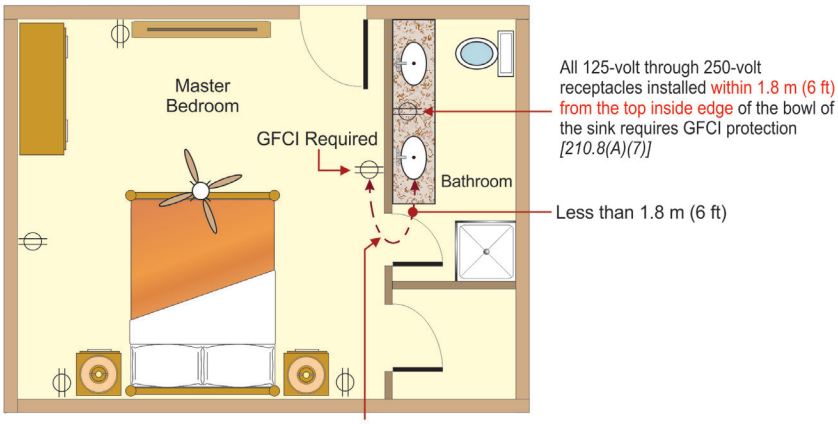
Article 100 Definition of a Dormitory

210.12 (C) AFCI protection in Nursing Homes and Limited Care facility Sleeping Rooms

210.8

Ground-Fault Circuit-Interrupter Protection for Personnel

210.8 Measurements for GFCI Protection



When determining if GFCI protection for personnel is required and a measurement is involved, the distance from a receptacle is required to be measured as the shortest path the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier, or the shortest path without passing through a ~~door, doorway, or~~ window *[210.8]*

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel

Type of change: Revision

Change at a Glance: Revision removes "door" and "doorway" as items the supply cord of an appliance connected to the receptacle should not pass through in order to satisfy measurement requirements for GFCI protection.

2017 Requirement: When determining if ground-fault circuit-interrupter (GFCI) protection for personnel was warranted and a measurement was involved, the distance from a receptacle was required to be measured as the shortest path the cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier, or passing through a door, doorway, or window.

2020 Requirement: For determining if ground-fault circuit-interrupter (GFCI) protection for personnel is required and a measurement is involved, the distance from a receptacle is required to be measured as the shortest path the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier, or the shortest path without passing through a window.

CODE LANGUAGE

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)~~(F). The ground-fault circuit interrupter shall be installed in a readily accessible location.

Informational Note No. 1: 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.
Informational Note No. 3: See 555.9 for GFCI requirements for boat hoists.
Informational Note No. 4: Additional GFCI requirements for specific circuits and equipment are contained in Chapters 4, 5, and 6.
For the purposes of this section, when determining the distance from receptacles the distance shall be measured as the shortest path the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier, or the shortest path without passing through a ~~door, doorway, or~~ window.

Analysis of Changes: For the 2017 *NEC*, a new provision was added at the parent text of 210.8 to indicate that measurements from receptacles to objects (*such as a sink*) that would qualify for GFCI protection should be measured as the "shortest path" a cord of an appliance connected to a receptacle would take without piercing a floor, wall, ceiling, or fixed barrier, or passing through a door, doorway, or window. Prior to this mandate on measurements, when the *Code* gave a measurable dimension such as where receptacles are installed within 1.8 m (6 ft) of a sink needing GFCI protection, there was great debate as to how this measurement was to be accomplished. What path should the installer or enforcer take to determine this distance? Various interpretations have been offered for accomplishing these measurements for as long as they have existed in the *Code* before this 2017 *NEC* provision.

These GFCI measurement requirements were further revised for the 2020 *NEC* by removing "doors and doorways" as items the supply cord of an appliance connected to the receptacle should not pass through in order to complete these GFCI-determining measurements. Is a cabinet door a "door" that would qualify for this measurement requirement? Most in the electrical industry would have answered, "yes" to that question. To eliminate all doubt, CMP-2 removed "door" and "doorway" from the list of obstacles that should not be measured through for this *Code* cycle. The removal of the words "door" and "doorway" addresses the confusion that a cabinet "door" is not intended to eliminate GFCI protection.

The receptacle that has raised the most question for this GFCI protection has been the 120-volt, 20-ampere receptacle under the kitchen sink for the garbage disposer. In the previous edition of the *Code*, in order to apply GFCI protection for this receptacle, one would have had to take the measurement from the top, inside edge of the sink [*see 210.8(A)(7)*] and pass through the kitchen cabinet door to complete this measurement (*which was prohibited by the parent text of 210.8*). For the 2020 *NEC*, passing the measurement through the cabinet door is no longer prohibited. Depending on the rules in place at the time for 210.8, 210.8(A)(6) (kitchens), and 210.8(A)(7) (sinks), this receptacle located under the kitchen sink in the cabinet did or did not required GFCI protection. 2011 *NEC* (No), 2014 *NEC* (Yes), 2017 *NEC* (No), and 2020 *NEC* (Yes). Hopefully, this revision will settle this issue down for a while and stop the back-and-forth for GFCI protection for these receptacles in these areas around sinks and cabinets.

Some in the electrical industry would argue that this revision took this GFCI requirement too far. The removal of "door" would have accomplished the intent of getting GFCI protection for the receptacle located under the kitchen sink behind a cabinet door. By also removing the word "doorway," this opened up GFCI protection to something like a receptacle located in a bedroom, but also located within 1.8 m (6 ft) of a bathroom sink when the measurement is taken from the top, inside edge of the bathroom sink, through the bathroom doorway to the bedroom receptacle located around the corner from the doorway. A bedroom receptacle outlet has never drawn requirements for GFCI protection but would demand GFCI protection under these unique circumstances.

First Revisions: FR 7863
Second Revisions: SR 7685
Public Inputs: PI 1080, PI 2291, PI 500, PI 4130
Public Comments: PC 845, PC 387

210.8(A)

Dwelling Unit GFCI Protection

210.8(A) Ground-Fault Circuit-Interrupter Protection for Personnel, Dwelling Units

Type of change: Revision

Change at a Glance: Dwelling unit GFCI protection has been expanded to all 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground installed in the specified areas of 210.8(A).

2017 Requirement: All 125-volt, single-phase, 15- and 20-ampere receptacles installed in (10) specific locations (*bathrooms, kitchens, laundry areas, etc.*) of a dwelling unit required ground-fault circuit-interrupter (GFCI) protection for personnel.

2020 Requirement: All 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground installed in (11) specific locations of a dwelling unit require ground-fault circuit-interrupter (GFCI) protection for personnel.

CODE LANGUAGE

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.

(A) Dwelling Units. All 125-volt through 250-volt, ~~single-phase, 15- and 20-ampere~~ receptacles installed in the locations specified in 210.8(A)(1) through ~~(10)~~(11) 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

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) Basements ~~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

Exception to (1) through (3), (5) through (8), and (10): *Listed locking support and mounting receptacles utilized in combination with compatible attachment fittings installed for the purpose of serving a ceiling luminaire or ceiling fan shall not be required to be ground-fault circuit-interrupter protected. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling fan, GFCI protection shall be provided.*

(11) Indoor damp and wet locations

Analysis of Changes: When the 1971 *NEC* was published, the first ground-fault circuit-interrupter (GFCI) protection requirements for dwelling units was introduced for personnel protection. Section 210-22(d) called for GFCI protection for all 120-volt, single-phase, 15- and 20-ampere receptacles installed outdoors. This started a journey of safety for dwelling units that has led to eleven specific locations that demand GFCI protection for this most recent *Code* cycle. Historically, GFCI protection at dwelling units has been limited to 125-volt, single-phase, 15- and 20-ampere receptacles. For the 2020 *NEC*, GFCI protection for personnel at dwelling unit will be expanded to include all 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground in the specific locations specified at 210.8(A)(1) through (A)(11) (*bathrooms, kitchens, outdoors, etc.*).

The addition of up to 250-volt receptacles and removing the amperage limitations of 15- and 20-amperes will provide GFCI protection to most receptacles commonly used in the specified areas of 210.8(A). The necessity for GFCI protection for areas such and kitchens and laundry areas has been proven for these receptacles over several *Code* cycles. 250-volt rated receptacles present similar shock hazards and substantiation submitted for this change demonstrated the need for GFCI protection for greater the 125-volt rated receptacles. Including these higher rated receptacles for GFCI protection at dwelling units is compatible with the GFCI protection provisions that occurred for other than dwelling units at 210.8(B) during the 2017 *NEC* revision cycle.

What this will all mean is the 240-volt, 30-ampere dryer receptacle in the utility room will now require GFCI protection, Same with the 240-volt, 50-ampere oven or range receptacle. Any receptacle rated up to 250-volts supplied by single-phase branch circuits rated 150 volts or less to ground and installed in a dwelling unit kitchen, bathroom, laundry area, garage, or any other dwelling unit location addressed at 210.8(A)(1) through (A)(11) will now required GFCI protection for personnel.

First Revisions: FR 7705, DFR 8119
Second Revisions: SR 7697
Public Inputs: PI 1875, PI 167
Public Comments: PC 2020, PC 901, PC 401

210.8(A)(5)

GFCI Protection in Dwelling Unit Basements

210.8(A)(5) GFCI Protection for Basements

All 125-volt through 250-volt receptacles supplied by a single-phase branch circuit rated 150 volts or less to ground installed in any and all dwelling unit basements will require ground-fault circuit-interrupter (GFCI) protection for personnel

Unfinished Basement

Finished Basement

210.8(A)(5) Ground-Fault Circuit-Interrupter Protection for Personnel, Dwelling Units, Basement

Type of change: Revision

Change at a Glance: GFCI protection now required for ***ALL*** dwelling unit basements (*not just unfinished portions of basements*).

2017 Requirement: All 125-volt, 15- and 20-ampere receptacles installed in dwelling unit unfinished basements required ground-fault circuit-interrupter (GFCI) protection for personnel. An unfinished portions or areas of a basement was identified as an area "not intended as a habitable room."

2020 Requirement: All 125-volt through 250-volt receptacles supplied by a single-phase branch circuit rated 150 volts or less to ground installed in any and all dwelling unit basements require ground-fault circuit-interrupter (GFCI) protection for personnel.

CODE LANGUAGE

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.

(A) Dwelling Units. All 125-volt through 250-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in 210.8(A)(1) through ~~(10)~~(11) and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel.

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

Analysis of Changes: An unfinished basement of a dwelling unit can be an area that has been shown to be subject to shock hazards from the use of electricity in these areas. Often accompanied by damp conditions, the use of power tools and other electrical equipment has driven the need for ground-fault circuit-interrupter (GFCI) protection for personnel in these areas of the dwelling unit. GFCI protection for all 125-volt, single-phase, 15- and 20-ampere receptacles in dwelling unit basements was first required in the 1987 *NEC*. During the 1993 *NEC*, an "unfinished" basement was first defined as "portions or areas of the basement not intended as habitable rooms and limited to storage areas, work areas, and the like." Two new exceptions for GFCI protection in an unfinished basement were added for the 1996 *NEC*. The first exception exempted receptacles that were not readily accessible, and the second exception eliminated receptacles installed in dedicated spaces for specific appliances from GFCI protection. A third exception was added for the 1999 *NEC* that identified a receptacle installed in an unfinished basement supplying a permanently installed fire or burglar alarm system from having to comply with GFCI requirements. Previous Exception No. 1 (*not readily accessible*) and Exception No. 2 (*specific appliances)* were removed from the *Code* during the 2008 *NEC* revision cycle leaving these previously exempted receptacles mandatory to GFCI provisions. These dwelling unit unfinished basement GFCI requirements remained unchanged through the 2017 *NEC*.

For the 2020 *NEC*, changes to the *Code* effected the GFCI requirements for receptacles in both an unfinished basement and a finished basement intended as a habitable space. The voltage and amperage thresholds that limited GFCI protection at dwelling units

to 125-volt, 15- and 20-ampere receptacles were revised to include all 125-volt through 250-volt receptacles supplied by a single-phase branch circuit rated 150 volts or less to ground [see Analysis text at 210.8(A)]. The second changes occurred at the GFCI provision of 210.8(A)(5). While this GFCI requirement was historically reserved for "unfinished" basements, changes to the 2020 *NEC* threw this GFCI provision open to ***ALL*** dwelling unit basements (*not just unfinished basements*), including basements that are finished out to be a habitable room or space such as a bedroom, exercise room, or game room.

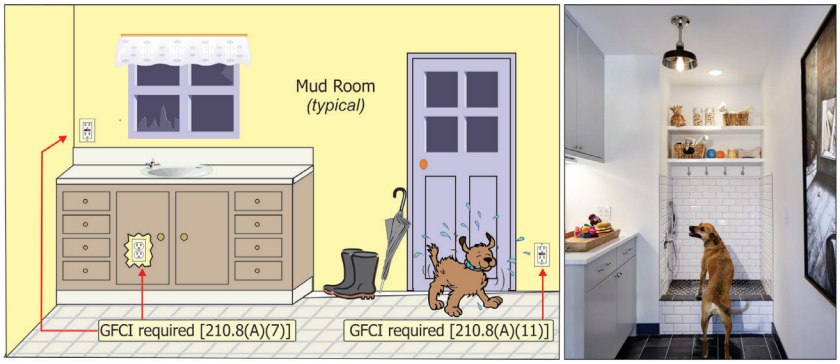
In qualifying the need for GFCI protection for more than an unfinished basement, CMP-2 concluded that conductive floor surfaces may exist in finished and unfinished basements and that basements (*whether finished or unfinished*) are prone to moisture including flooding, thus making GFCI protection a requirement for all basements of a dwelling unit. History has proven that unfinished areas of a basement expose the user of electrical equipment and devices to grounded surfaces and or surfaces in contact to the earth through concrete floors, masonry walls and steel columns embedded in concrete floors. Finished basement floors typically have a painted concrete floor or tiled areas with masonry grout in contact with a concrete floor or masonry walls that are indirectly in contact with the earth. The potential of electrical hazards that reside in basements are not eliminated by establishing a demarcation of finished surfaces compared to unfinished surfaces. The receptacle outlets in finished basements are often used for powering lamps, entertainment equipment, interactive games systems, etc. A prevalent moisture hazard exists with a person being in contact with a damp floor, independent of flooring type, and then interacting with the electrical system. The user of these devices is at the same risk of shock hazard as in an unfinished basement.

First Revisions: FR 7705, DFR 8120
Second Revisions: SR 7697
Public Inputs: PI 46, PI 599, PI 1875, PI 167
Public Comments: PC 696, PC 1437, PC 1384, PC 901, PC 247, PC 401, PC 563

210.8(A)(11)

GFCI Protection at Indoor Damp and Wet Locations of Dwelling Units

210.8(A)(11) GFCI Protection for Indoor Damp or Wet Locations



All 125-volt through 250-volt receptacles supplied by a single-phase branch circuit rated 150 volts or less to ground installed in indoor damp or wet locations require ground-fault circuit-interrupter (GFCI) protection for personnel

210.8(A)(11) Ground-Fault Circuit-Interrupter Protection for Personnel, Dwelling Units, Indoor damp and wet locations

Type of change: New

Change at a Glance: GFCI protection is now required at indoor damp and wet locations of dwelling units.

2017 Requirement: Ground-fault circuit-interrupter (GFCI) protection was required in specific areas of the dwelling that might be damp or wet on occasion such as kitchens, bathrooms, laundry rooms, bathtub and shower areas, but no specific GFCI requirement for damp or wet locations inside a dwelling unit.

2020 Requirement: List item (11) was added to 210.8(A) requiring GFCI protection for all 125-volt through 250-volt receptacles supplied by a single-phase branch circuit rated 150 volts or less to ground installed in indoor damp or wet locations regardless of its location.

CODE LANGUAGE

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.

(A) Dwelling Units. All 125-volt through 250-volt~~, single-phase, 15- and 20-ampere~~ receptacles installed in the locations specified in 210.8(A)(1) through ~~(10)~~(11) and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel.

(11) Indoor damp and wet locations

Analysis of Changes: If you encounter a damp or wet location in a dwelling unit, chances are pretty good that those locations would be required to supply ground-fault circuit-interrupter (GFCI) protection. Especially if they are located in a bathroom, laundry area, or around a bathtub or shower area. Receptacles in these areas or located within 1.8 m (6 ft) of sinks in these areas required GFCI protection by the existing rules at 210.8(A)(1) through (A)(10). What if you were to encounter an area of the dwelling unit that could be considered a damp or wet location and that locations were not within 1.8 m (6 ft) of a sink, bathtub, or shower area? What if this potential damp or wet location was not located in one of the areas specified by the previous text of 210.8(A)(1) through (A)(10) such as a kitchen or laundry area?

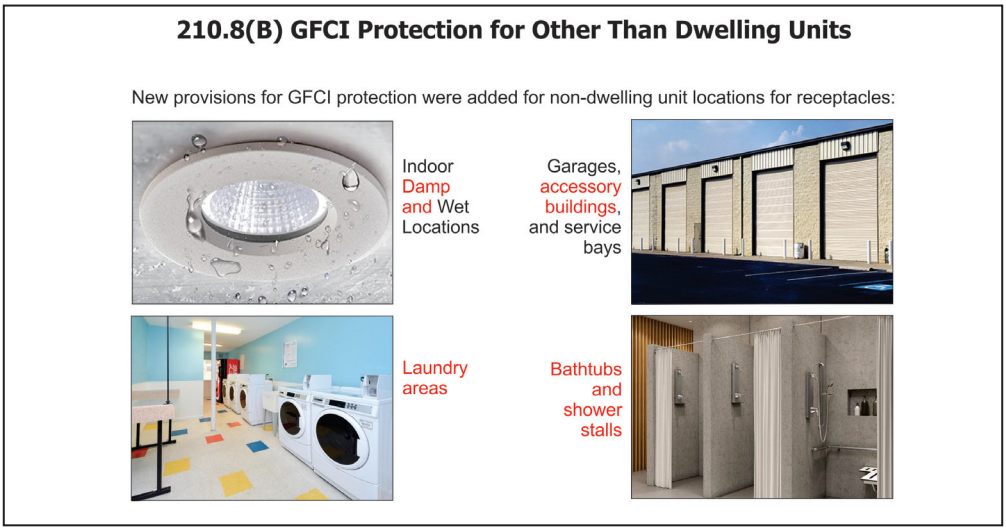
For the 2020 *NEC*, a new list item (11) was added that will require GFCI protection for all 125-volt through 250-volt receptacles supplied by a single-phase branch circuit rated 150 volts or less to ground installed in indoor damp or wet locations regardless of the room or areas of the dwelling unit it might be located in. The areas that come to mind that this will affect are areas like a mud room with no sink or a mud room with a sink but receptacles in that area are located greater than 1.8 m (6 ft) from said sink. Another area that this new provision will cover would be an indoor area where animals like dogs are washed down before being permitted to re-enter the main dwelling unit.

Of course, this is open to interpretation. What is an indoor damp or wet location? Hopefully, the definitions for a damp, wet, or dry location found in Article 100 will be considered in making the determination as to an area's location being considered damp, wet, or dry. Who determines if a location (indoors or outdoors) is considered a damp, wet, or dry location? That would be up to the authority having jurisdiction (AHJ).

First Revisions: FR 7705, DFR 8121
Public Inputs: PI 1889

210.8(B)

GFCI Requirements at Non-Dwelling Unit Locations



210.8 Ground-Fault Circuit-Interruper Protection for Personnel

Type of change: New

Change at a Glance: New GFCI requirements at non-dwelling unit locations were added for damp locations, accessory buildings, laundry areas, and areas around bathtubs and shower stalls.

2017 Requirement: GFCI requirements for other than dwelling units applied to 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 (1) bathrooms, (2) kitchens, (3) rooftops, (4) outdoors, (5) within in 1.8 m (6 ft) of the top inside edge of a sink, (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, and (10) Unfinished portions or areas of the basement not intended as habitable rooms.

2020 Requirement: In addition to the areas listed in the 2017 *NEC*, GFCI protection was expanded to non-dwelling unit (2) areas with a sink and permanent provisions for either food preparation or cooking, (6) indoor damp locations, (8) accessory building, (11) laundry areas, and (12) receptacles that are installed within 1.8 m (6 ft) of the outside edge of a bathtub or shower stall.

CODE LANGUAGE

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)~~(F). The ground-fault circuit interrupter shall be installed in a readily accessible location.
(See NEC for remainder of Code text)
(B) Other Than Dwelling Units. All ~~single-phase~~ 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground ~~or less~~, 50 amperes or less and all receptacles supplied by three-phase ~~receptacles~~ branch circuits rated 150 volts or less to ground ~~or less~~, 100 amperes or less installed in the ~~following~~ locations specified in 210.8(B)(1) through (B)(12) shall have ground-fault circuit-interrupter protection for personnel.
(1) Bathrooms
(2) Kitchens or areas with a sink and permanent provisions for either food preparation or cooking
(3) Rooftops
Exception: 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)(2) 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 Category 2 (general care) or Category 1 (critical care) spaces of health care facilities ~~other than those covered under 210.8(B)(1), GFCI protection shall not be required~~ shall be permitted to comply with 517.21.

(6) Indoor damp and wet locations

(7) Locker rooms with associated showering facilities

(8) Garages, accessory buildings, 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~~ basements ~~not intended as habitable rooms~~

Exception to (1) through (5), (8), and (10): Listed locking support and mounting receptacles utilized in combination with compatible attachment fittings installed for the purpose of serving a ceiling luminaire or ceiling fan shall not be required to be ground-fault circuit-interrupter protected. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling fan, GFCI protection shall be provided.

(11) Laundry areas

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

Analysis of Changes: Ground-fault circuit-interrupter (GFCI) protection for personnel at "other than dwelling units" was first introduced to the public for the 1993 edition of the *NEC*. These GFCI provisions were applicable to 125-volt, single-phase, 15- and 20-ampere receptacles. For the 1993 *NEC*, GFCI protection was required for receptacles in non-dwelling unit bathrooms and receptacles installed on a non-dwelling unit rooftop. These two pioneer areas for non-dwelling unit GFCI protection continue to be applicable even until the latest edition of the *NEC* with an exception for outdoors added during the 1999 *NEC*. This exception removed GFCI protection for a receptacle that was not readily accessible and dedicated to deicing and snow-melting equipment under the purview of Article 426 (*Fixed Outdoor Electric Deicing and Snow-Melting Equipment*). During the 2002 *NEC*, kitchens were added to the GFCI requirements for other than dwelling units. This GFCI rule was different that its cousin requirement for dwelling units as it applied to all non-dwelling unit kitchen receptacles (not just receptacles that served a kitchen countertop). For the 2005 *NEC*, "kitchens" was revised to "commercial and institutional kitchens" with a definition of a "kitchen" added as an "area with a sink and permanent facilities for food preparation and cooking." The 2005 *NEC* also saw outdoor areas in public spaces and outdoor receptacles installed to comply with 210.63 (*receptacle installed in close proximity to outdoor HVAC equipment*).

The 2008 *NEC* witnessed a new exception added to exempt outdoor receptacles at industrial establishment where conditions of maintenance and supervision ensure only qualified personnel are involved. Receptacles installed within 1.8 m (6 ft) of the outside edge of a non-dwelling unit sink (*with two exception*) was also added for the 2008 *NEC* as well. For the 2011 version of the *NEC*, indoor wet locations, locker rooms

with associated showering facilities, and garages, service bays, and similar areas where electrical diagnostic equipment, electrical hand tools, or portable lighting equipment are to be used were areas added to the non-dwelling unit GFCI requirements. Garages and service bays were revised for the 2014 *NEC* to address garages, service bays, and similar areas "other than vehicle exhibition halls and showrooms." The 2017 *NEC* was revised to change the limit of non-dwelling unit GFCI protection from 125-volt, single-phase, 15- and 20-ampere rated receptacles to 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. The previous edition of the *Code* also incorporated GFCI protection for crawl spaces (at or below grade level) and unfinished basements that are not intended as habitable rooms.

GFCI protection for receptacles at non-dwelling units was further expanded for the 2020 *NEC*. List Item (2) was expanded to included GFCI protection for receptacles in non-dwelling unit kitchens "or areas with a sink and permanent provisions for either food preparation or cooking." This revision will be expanded upon in greater detail in the next changes address by this publication at 210.8(B)(2). The next significate change in 210.8(B) was at List Item (6) where an indoor "damp" location was added to the existing GFCI requirement for indoor wet non-dwelling unit locations. This revision occurred for clarity and consistency as the shock hazard in a damp location is similar in nature a wet location.

The requirement for GFCI protection for receptacles in a non-dwelling unit accessory building were added at 210.8(B)(8) that already covered garages, service bays, and similar areas other than vehicle exhibition halls and showrooms. An accessory building can have the same degree of shock hazard as garages and vehicle service bays and deserved the same level of GFCI protection.

An exception to (B)(1) through (B)(5), (B)(8), and (B)(10) was added pertaining to "listed locking support and mounting receptacles" utilized in combination with compatible attachment fittings installed for the purpose of mounting a ceiling luminaire or ceiling fan. This exception deleted GFCI protection for these devices. These listed locking support and mounting receptacles are (by definition) a "receptacle." During the 2017 *NEC* revision cycle, the age-old definition of a "receptacle" in Article 100 had to be revised to incorporate these mounting devices. A receptacle is now defined as 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." This revised definition was necessary to correlate with the provisions at 314.27(E) (Separable Attachment Fittings). GFCI protection for all of these non-dwelling unit receptacles was intended for a traditional receptacle where a cord cap would be inserted. Without this exception, luminaire outlets and ceiling fans would have required GFCI protection when utilizing these locking support and mounting receptacles. The same exception was also added at 210.8(A) for dwelling units (*see DFR 8122, SR 7697, PI 3886, PI 1980, and PC 1719*).

A new List Item (11) was added to 210.8(B) that will require GFCI protection for receptacles installed in non-dwelling unit laundry areas. GFCI requirements were added

for dwelling unit laundry areas in the 2014 *NEC*. Laundry areas typically involve electrical appliances and the presence of water with a resulting increased risk of electric shock hazards. Laundry areas at non-dwelling units are similar to laundry areas of a dwelling unit and deserve the same GFCI protection. Most condominiums and apartment complexes provide a common laundry building or area as a convenience to the tenants. An apartment dweller deserves the same GFCI protection as their counterpart that lives in a single-family dwelling unit.

And finally, a new List Item (12) was added to 210.8(B) calling for GFCI protection for receptacles installed within 1.8 m (6 ft) of the outside edge of a non-dwelling unit bathtub or shower stall. Shower stalls and bathtubs can exist in commercial and industrial locations outside of a locker room or bathroom for a variety of purposes such as decontamination, and safety applications. Receptacles installed within 1.8 m (6 ft) of these bathtubs or shower stalls have similar shock hazards as a bathtub or shower stall installed in a bathroom or locker room. These areas often have tile or other conductive or grounded floors, which can present a shock hazard to a person getting out of the shower or bathtub. This requirement for non-dwelling unit bathtubs or shower stalls mirrors that found at 210.8(A)(9) for dwelling unit bathtub or shower stalls, which was added during the 2014 *NEC* revision cycle.

First Revisions: List Item (6) [SR 7724, PC 854]; List Item (8) [DFR 8124, PI 1429]; Ex: DFR 8128, SR 7724, PI 1984, PI 3891, PC 1720; List Item (11) [DFR 8126, PI 700, PI 4072]; List Item (12) [DFR 8127, PI 324]

210.8(B)(2)

GFCI Protection for Personnel in Other Than Dwelling Kitchens

210.8(B)(2) GFCI Protection for Kitchens and More

GFCI protection required for all 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less and all receptacles supplied by three-phase branch circuits rated 150 volts or less to ground, 100 amperes or less installed in areas defined as a "kitchen" and areas with a sink and permanent provisions for *either* food preparation *or* cooking

Coffee Shop
(no permanent provisions for cooking)

Ice Cream Parlor
(no permanent provisions for cooking)

210.8(B)(2) Ground-Fault Circuit-Interrupter Protection for Personnel, Other Than Dwelling Units, Kitchens

Type of change: Revision

Change at a Glance: Additional language was added to clarify that areas *not defined as a kitchen such as ice cream parlors, coffee shops, smoothie stores, etc.*, with a sink and permanent provisions for either food preparation or cooking have the same potential for shock hazards as a kitchen.

2017 Requirement: GFCI protection was required for 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 any area defined as a "kitchen," with a kitchen defined as "an area with a sink and permanent provisions for food preparation and cooking."

2020 Requirement: GFCI protection is now required for all 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less and all receptacles supplied by three-phase branch circuits rated 150 volts or less to ground, 100 amperes or less installed in areas defined as a "kitchen" and areas with a sink and permanent provisions for either food preparation or cooking.

CODE LANGUAGE

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)~~(F). The ground-fault circuit interrupter shall be installed in a readily accessible location.
(See NEC for remainder of Code text)
(B) Other Than Dwelling Units. All ~~single-phase~~ 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground ~~or less~~, 50 amperes or less and all receptacles supplied by three-phase ~~receptacles~~ branch circuits rated 150 volts or less to ground ~~or less~~, 100 amperes or less installed in the ~~following~~ locations specified in 210.8(B)(1) through (B)(12) shall have ground-fault circuit-interrupter protection for personnel.

(2) Kitchens or areas with a sink and permanent provisions for either food preparation or cooking

Analysis of Changes: Ground-fault circuit-interrupter (GFCI) protection for personnel at "other than dwelling units" kitchens was first implemented for enforcement in the 2002 *NEC*. With this 2002 *NEC* addition, the word "Kitchens" was added at 210.8(B)(3) as the third area at non-dwelling unit locations requiring GFCI protection for all 125-volt, single-phase, 15- and 20-ampere receptacles joining bathrooms and rooftops. This GFCI rule was different than its similar counterpart requirement for dwelling unit kitchens as it applied to all non-dwelling unit kitchen receptacles (*not just receptacles that served a kitchen countertop*). Part of the substantiation for extending GFCI protection to non-dwelling unit kitchens pertained to an electrocution at a restaurant. A 25-year-old male restaurant manager was cleaning the floor of the kitchen when he came in contact with a refrigerator that had a ground fault and was electrocuted. The victim, who was wearing tennis shoes, put soap and water on the floor and slipped and grabbed the

handle of the commercial refrigerator (which had a ground fault) and the cord did not have a ground prong. The ground fault was apparently caused by excessive wear on the insulation of the conductors (wires) supplying power to the refrigerator compressor. The conductors were exposed and were not protected from abrasion and were not protected by strain relief. If the *Code* had only required the receptacle outlets required the receptacle outlets at non-dwelling unit kitchens that serve kitchen countertops to be GFCI protected, this tragedy would have still occurred. With the substantiation provided, CMP-2 was intentional in requiring ALL non-dwelling unit kitchen 125-volt, single-phase, 15- and 20-ampere receptacles to be GFCI protected.

With the addition of this single word and, at the time, no definition for a "kitchen," there was wide interpretation as to what constituted a "kitchen" and what did not. For the 2005 *NEC*, "kitchens" was revised at 210.8(B) to "commercial and institutional kitchens" with a description or definition of a "kitchen" added indicating that a kitchen was an "area with a sink and permanent facilities for food preparation and cooking." With the addition of "commercial and institutional kitchens," this phrase provided a better overall concept of what this GFCI rule was intended to cover. There are many different designs and configurations of commercial kitchens. Certainly, it is reasonable to conclude that a non-dwelling unit kitchen is an area where there is a sink and provisions for food preparation, sanitation, and cooking. This 2005 *NEC* definition was intended to distinguish commercial and institutional kitchens from those areas that might have a portable cooking appliance or a waitress station where food is kept warm for serving. This definition of a "kitchen" was moved to Article 100 for the 2008 *NEC* so this definition could apply to all kitchens (not just non-dwelling unit kitchens). This definition remained basically the same where a "kitchen" was defined in the 2017 *NEC* as "an area with a sink and permanent provisions for food preparation and cooking."

For the 2020 *NEC*, the GFCI provisions for 210.8(B)(2) have been expanded to not only kitchens but "areas with a sink and permanent provisions for <u>either</u> food preparation <u>or</u> cooking." The definition of a "kitchen" remains the same in Article 100 as "an area with a sink and permanent provisions for food preparation <u>and</u> cooking." The additional added language clarifies that areas (not defined as a kitchen) with a sink and either permanent provisions for cooking or food preparation have the same potential for shock hazards as a kitchen. This would include areas such as ice cream parlors, coffee shops, yogurt or smoothie stores, etc. These areas typically have stainless steel countertop and/or stainless steel appliances but no "permanent provisions for cooking." These facilities have at least the same potential for shock hazards as a kitchen.

First Revisions: FR 7791, GFR 8129
Public Inputs: PI 3048

210.8(D)

GFCI Protection in Specific Appliances

210.8(D) GFCI Protection for Specific Appliances

New text at new 210.8(D) titled, "Specific Appliances" and the move of the GFCI requirement for dishwashers correlates the requirements found in 422.5(B) (Type and Location for GFCI protection for appliances) and refers to the list of appliances requiring GFCI protection in 422.5(A)

Dishwashers GFCI protection was moved from 210.8(D) to 422.5(A)(7)

Vending machine GFCI protection cannot be factory installed within the appliance

210.8(D) Ground-Fault Circuit-Interrupter Protection for Personnel, Specific Appliances

Type of change: New

Change at a Glance: New List Item (D) correlates the requirements found in 422.5(B) (*Type of GFCI protection for appliances*) and refers to the list of GFCI requirements for appliances in 422.5(A) for continued consistency as the list is modified in future *Code* editions.

2017 Requirement: The majority of GFCI requirements for appliances were found at 422.5 in Article 422 (Appliances). The GFCI requirements for dwelling unit dishwashers (an appliance) was located at 210.8(D), which called for GFCI protection for outlets that supply dishwashers installed in dwelling unit locations.

2020 Requirement: The former GFCI requirements for a dwelling unit dishwasher were moved from 210.8(D) to 422.5(A)(7) (*which now covers all dishwashers*) with the bulk of GFCI requirements for appliances. Modern-day electronically controlled dishwashers have a different failure mode and the potential for an in increased risk of electrical shock than their electromechanical ancestors. While the need for GFCI protection could be agreed upon, the location of the requirement was questionable from its inception.

CODE LANGUAGE

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)~~(F). The ground-fault circuit interrupter shall be installed in a readily accessible location.

(See NEC for remainder of Code text)

(D) Specific Appliances. Unless GFCI protection is provided in accordance with 422.5(B)(3) through (B)(5), the outlets supplying the appliances specified in 422.5(A) shall have GFCI protection in accordance with 422.5(B)(1) or (B)(2). Where the appliance is a vending machine as specified in 422.5(A)(5) and GFCI protection is not provided in accordance with 422.5(B)(3) or (B)(4), branch circuits supplying vending machines shall have GFCI protection in accordance with 422.5(B)(1) or (B)(2).

Analysis of Changes: During the 2014 *NEC* revision cycle, a new rule was added at 210.8(D) calling for GFCI protection for all outlets that supply dishwashers installed in dwelling units. This included a receptacle outlet or a hard-wired outlet for a dishwasher. Article 210 is titled, "Branch Circuits" and contains rules for receptacle placement. Some would argue that the proper location for a rule dealt with an appliance would be more appropriately covered in Chapter 4 and in particular, Article 422 of the *NEC*. For the 2020 *NEC*, this GFCI rule for dishwashers has been relocated to 422.5(A)(7) for GFCI requirement for appliances. It should be noted that this GFCI requirement that only applied to a dwelling unit dishwasher in the past, now is prevalent for all dishwashers.

The new text at new 210.8(D) titled, "Specific Appliances" and the move of the GFCI requirement for dishwashers correlates the requirements found in 422.5(B) (*Type and Location for GFCI protection for appliances*) and refers to the list of appliances requiring GFCI protection in 422.5(A). This will also provide for continued consistency especially as the list of appliances requiring GFCI protection is modified in future *Code* cycles.

This new requirement attempts to build a bridge for GFCI requirements from 210.8 to 422.5. This new provision at 210.8(D) calls for GFCI protection to be provided for an appliance either as an integral part of the attachment plug, located within the supply cord not more than 300 mm (12 in.) from the attachment plug, or factory installed within the appliance. If those three options are not achievable, then the GFCI protection must be provided by the overcurrent device or a GFCI device installed in the supply circuit such as a GFCI receptacle located at the outlet for the appliance.

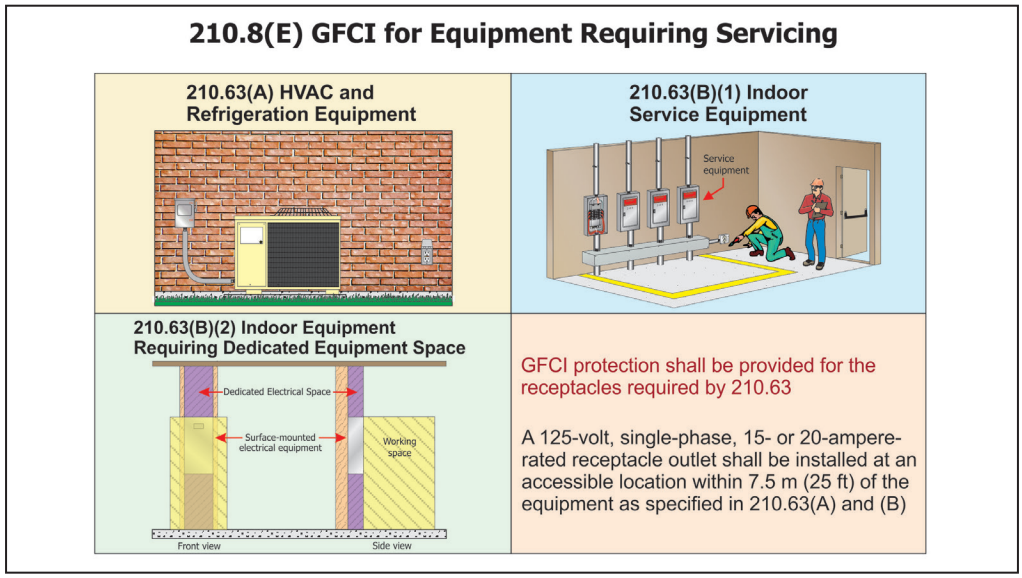
Where the appliance is a vending machine and GFCI protection is not provided as an integral part of the attachment plug or located within the supply cord not more than 300 mm (12 in.) from the attachment plug, the branch circuit(s) supplying vending machines is required to have GFCI protection provided by the overcurrent device or a GFCI device installed in the supply circuit. This eliminates the GFCI protection on a vending machine from being factory installed within the vending machine. Ground-fault hazards typically occur with vending machines when the connection method (*typically a supply cord*) is damaged and energizes the metal frame of the vending machine. Locating the GFCI either in the branch circuit, or within 300 mm (12 in.) of, or within

the attachment plug addresses these hazards. Locating the GFCI within the appliance does not remedy that danger.

First Revisions: FR 7689
Second Revisions: SR 7737
Public Inputs: PI 2730
Public Comments: PC 2206

210.8(E)

GFCI Protection for Equipment Requiring Servicing



210.8(E) Ground-Fault Circuit-Interrupter Protection for Personnel, Equipment Requiring Servicing

Type of change: New

Change at a Glance: GFCI protection is now required for the receptacles required by 210.63 for HVAC equipment, indoor service equipment, and indoor equipment requiring dedicated equipment space.

2017 Requirement: Section 210.63 required a 125-volt, single-phase, 15- or 20-ampere-rated receptacle outlet to be installed at an accessible location on the same level and within 7.5 m (25 ft) of heating, air-conditioning, and refrigeration equipment. If this required receptacle was located outdoors, GFCI protection was required by 210.8(A)(3) or 210.8(B)(4). The requirements of 210.64 called for at least one 125-volt, single-phase, 15- or 20-ampere-rated receptacle outlet located within the same room or area and installed in an accessible location within 7.5 m (25 ft) of non-dwelling unit indoor electrical service equipment. Neither of these provisions demanded GFCI protection for these required receptacles.

2020 Requirement: GFCI protection is now required for all receptacle outlets required by 210.63, which would include a 125-volt, single-phase, 15- or 20-ampere-rated receptacle outlet installed at an accessible location on the same level and within 7.5 m (25 ft) of heating, air-conditioning, and refrigeration equipment, indoor service equipment, and indoor equipment requiring dedicated equipment space.

CODE LANGUAGE

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)~~(F). The ground-fault circuit interrupter shall be installed in a readily accessible location.

(See NEC for remainder of Code text)

(E) Equipment Requiring Servicing. GFCI protection shall be provided for the receptacles required by 210.63.

Analysis of Changes: In the previous edition of the *Code*, 210.63 called for a 125-volt, single-phase, 15- or 20-ampere-rated receptacle outlet to be installed at an accessible location within 7.5 m (25 ft) of heating, air-conditioning, and refrigeration equipment. This HVAC equipment was typically located outdoors. For the 2020 *NEC*, 210.63 was revised and divided into two list items with the "125-volt, single-phase, 15- or 20-ampere-rated receptacle outlet to be installed at an accessible location within 7.5 m (25 ft)" requirement applying to both list items. List Item (A) is the text from previous 210.63 dealing with HVAC equipment. New 210.63(B)(1) is the previous text from previous 210.64 dealing with indoor service equipment. New 210.63(B)(2) is a new requirement pertaining to indoor equipment requiring dedicated equipment space. If this equipment is located outdoors, the requirements of 210.8(A)(3) and 210.8(B)(4) would drive GFCI protection for this required receptacle. In previous editions of the *Code*, there was no GFCI requirement for the required receptacle when it was installed indoors.

For the 2020 *NEC*, a new 210.8(E) titled, "Equipment Requiring Servicing" will require GFCI protection for all the receptacles required by 210.63 (*indoors and outdoors*). The receptacles required by 210.63 are typically required for the expressed purpose of providing maintenance workers with the necessary access to power for the use of portable tools on the described equipment. Additionally, these receptacles can be located up to 7.5 m (25 ft) away from the equipment, so the use of an extension cord is not uncommon, which can increase the likelihood of a shock hazard.

It is not uncommon for the *NEC* to require GFCI protection for maintenance or service personnel while working on electrical equipment. An example of this can be found at 511.12 (Commercial Garages) and 513.12 (Aircraft Hangars). Both locations require GFCI protection as provided by 210.8(B). Maintenance and service personnel can often be found in commercial garages and aircraft hangers working with electrical diagnostic equipment, electrical hand tools, or portable lighting equipment increasing the need for GFCI protection. The same can be said of the indoor electrical service equipment areas and indoor equipment areas requiring dedicated equipment space.

Seconcd Revisions: SR 7587
Public Inputs: PI 1397
Public Comments: PC 681

210.8(F)

GFCI Protection in Outdoor Outlets

210.8(F) Ground-Fault Circuit-Interrupter Protection for Personnel, Outdoor Outlets

Type of change: New

Change at a Glance: GFCI protection is now required on dwelling unit outdoor outlets supplied by single-phase branch circuit rated 150 volts or less to ground, and 50 amperes or less (including 240-volt AC units).

2017 Requirement: GFCI protection was required for all 125-volt, single-phase, 15- and 20-ampere receptacle outlets installed outdoors at dwelling units.

2020 Requirement: GFCI protection is required for all 125-volt through 250-volt receptacle outlets supplied by single-phase branch circuits rated 150 volts or less to ground installed in outdoor locations. Additionally, all outdoor outlets for dwelling units that are supplied by single-phase branch circuits rated 150 volts to ground or less, 50 amperes or less will now require GFCI protection (*with exceptions*). A branch circuit dedicated to deicing and snow-melting equipment or pipeline and vessel heating equipment is not required to be GFCI protected under very specific conditions as this receptacle outlet is exempt from GFCI protection by the requirements of 426.28 (*fixed outdoor electric deicing and snow-melting equipment.*) and 427.22 (*electric heat tracing and heating panels*). GFCI protection is also exempted for outdoor lighting outlets other than those covered in 210.8(C) (*crawl space lighting outlets*).

CODE LANGUAGE

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)~~(F). The ground-fault circuit interrupter shall be installed in a readily accessible location.
(See NEC for remainder of Code text)

(F) Outdoor Outlets. All outdoor outlets for dwellings, other than those covered in 210.8(A)(3), Exception to (3), that are supplied by single-phase branch circuits rated 150 volts to ground or less, 50 amperes or less, shall have ground-fault circuit-interrupter protection for personnel.
Exception: *Ground-fault circuit-interrupter protection shall not be required on lighting outlets other than those covered in 210.8(C).*

Analysis of Changes: GFCI protection for outdoor receptacle outlets at dwelling units has been a part of the *Code* since the 1971 edition of the *NEC* [*see 210-22(d) of the 1971 NEC*]. For the 2020 *NEC*, all outdoor outlets for dwelling units (with exceptions) that are supplied by single-phase branch circuits rated 150 volts to ground or less, 50 amperes or less will be required to be GFCI protected. A branch circuit dedicated to deicing and snow-melting equipment is exempt for this GFCI requirement to avoid a conflict with requirements at 426.28 (*fixed outdoor electric deicing and snow-melting equipment.*) and 427.22 (*electric heat tracing and heating panels*). GFCI protection is also exempted for outdoor lighting outlets other than those covered in 210.8(C) (*crawl space lighting outlets*).

The most dramatic effect this new requirement will have is requiring GFCI protection for dwelling unit outdoor-installed heat pumps and air-conditioning units. With this requirement applying to "all outdoor outlets," this would include outdoor hard-wired AC units. This new section requiring GFCI protection on outdoor outlets for dwellings is related to the submitted substantiation detailing a couple of facilities associated with outdoor outlet connected equipment such as an outdoor HVAC condensing unit.

One could argue that GFCI protection for outdoor outlets serving loads such as HVAC equipment or a heat pump is not unprecedented or an exceptional load that would create an incompatibility load concern. GFCI protection for commercial kitchen 125-volt, single-phase, 15- and 20-ampere receptacle outlet applications was added to the 2008 edition of the *NEC*. This resulted in compressor-based refrigeration equipment and variable speed drives for motors on mixers and other commercial kitchen appliances requiring GFCI protection. That same GFCI protection was expanded to such receptacles as 250-volt, single-phase, 50-ampere rated receptacles for the previous edition of the *Code*. This expansion in non-dwelling unit applications was even expanded to three-phase receptacles rated up to 100-amperes. Some would argue that HVAC equipment is typically located in high-humidity, wet locations that will lend itself to nuisance tripping of GFCI devices for this new application. GFCI protection for receptacles that supply swimming pool pump motors rated 15- or 20-amperes, 120-volt through 240-volt, single-phase was introduced into the *Code* during the 2002 *NEC* revision cycle. These areas are typically high-humidity areas and even wet location applications. This 17-year-old provision for GFCI protection in these aquatic applications has stood the test of time