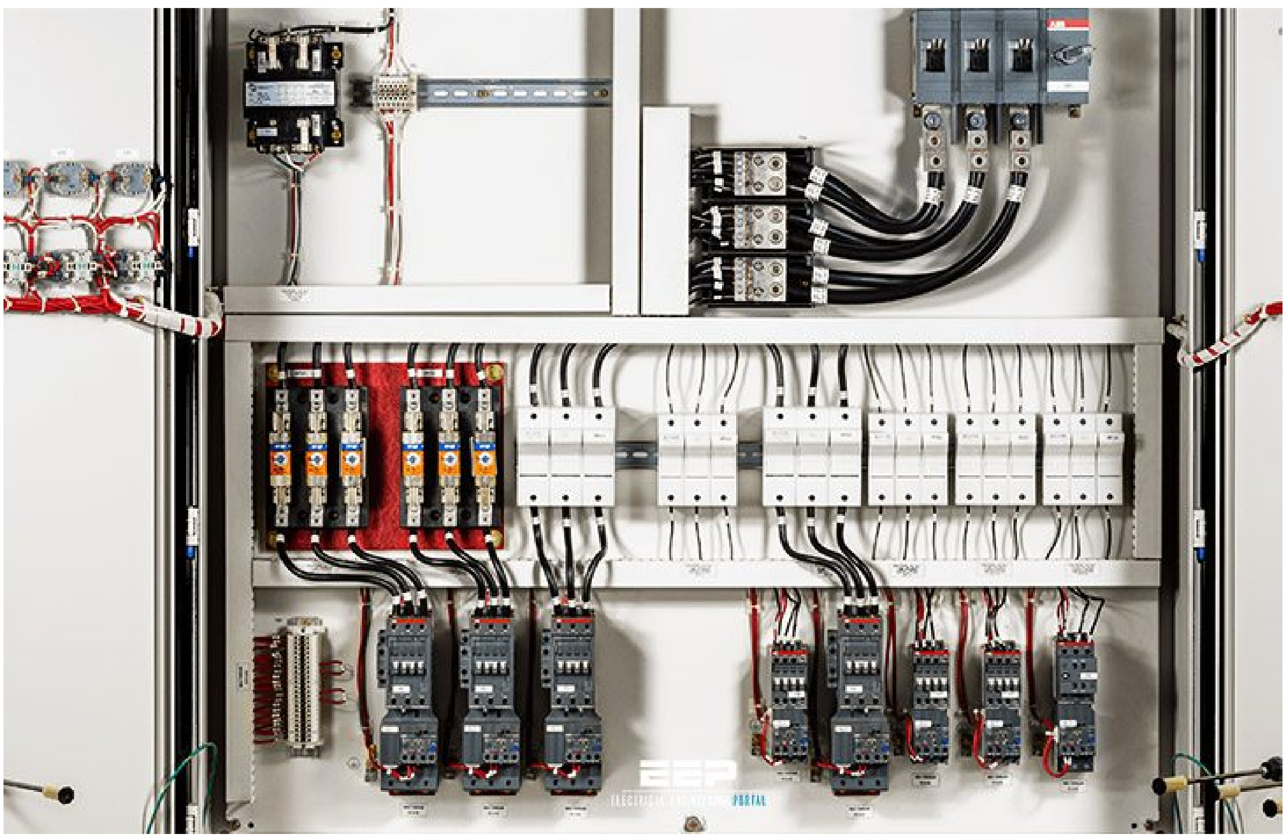
FDA Inc. Course#

NEC 2017 Code Changes in Wiring & Protection



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The *National Electrical Code* is updated on a three-year *Code* cycle. The International Association of Electrical Inspectors publishes its *Analysis of Changes* every three years on the same publishing schedule as the *NEC.* This course is based on the revisions to the 2017 *NEC.*

The 2017 *NEC* experienced a change in the revision process. In the past, the first public meeting for the *NEC* revision process was known as the Report on Proposals. This was replaced with the 2017 *NEC* First Draft meeting.

Suggested changes to the *NEC*, which were known as Proposals, were replaced with Public Inputs. The PIs that were acted upon favorably resulted in a First Revision to the First Draft of the 2017 *NEC.*

The second public meeting for the *NEC* revision process was known as the Report on Comments meeting, which was replaced with the 2017 *NEC* Second Draft meeting. Submitted Comments were replaced with Public Comments.

Successful PCs resulted in Second Revisions to the Second Draft of 2017 *NEC.* Appeals will be heard and voting for acceptance of the 2017 *NEC* will take place at the NFPA Annual Conference in June 2016. The NFPA Standards Council will issue the 2017 *NEC* in August 2016 with a publication date of September of 2016.

There were 4102 Public Inputs submitted from interested participants, which resulted in 1233 First Revisions to the First Draft of the 2017 *NEC.* A total of 1513 Public Comments resulted in 559 Second Revisions to the Second Draft of the *NEC.*

In this book, IAEI has reported on the most significant changes to the 2017 *NEC.* The revisions reported on in this publication were based on the Second Draft of the 2017 *NEC.* While IAEI takes every precaution to deliver the most

accurate account of the changes to the latest edition of the *NEC*, these revisions are subject to alterations from the time of publication of the *Analysis of Changes* to the deliverance of the final version of the 2017 *NEC.*

Wiring & Protection

Articles 210 – 250

210.5(C)(1), Exception

Identification for Ungrounded Conductors

Type of Change: New

Summary of change: A new exception was added for identifying each ungrounded conductor for existing installations where a voltage system(s) already exists and a different voltage system is being added.

Code Language: 210.5 Identification for Branch Circuits.

(C) Identification of Ungrounded Conductors. Ungrounded conductors shall be identified in accordance with 210.5(C)(1) or (2), as applicable.

(1) Branch Circuits Supplied from More Than One Nominal Voltage System. Where the premises wiring system has branch circuits supplied from more than one nominal voltage system, each ungrounded conductor of a branch circuit shall be identified by phase or line and system at all termination, connection, and splice points in compliance with 210.5(C)(1)(a) and (b).

(a) Means of Identification. The means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means.

(b) Posting of Identification Means. The method utilized for conductors originating within each branch-circuit panelboard or similar branch-circuit distribution equipment shall be documented in a manner that is readily available or shall be permanently posted at each branch-circuit panelboard or similar branch-circuit distribution equipment. The label shall be of sufficient durability to withstand the environment involved and shall not be handwritten.

Exception: *In existing installations where a voltage system(s) already exists and a different voltage system is being added, it shall be permissible to mark only the new system voltage. Existing unidentified systems shall not be required to be identified at each termination, connection, and splice point in compliance with*

210.5(C)(1)(a) and (b). Labeling shall be required at each voltage system distribution equipment to identify that only one voltage system has been marked for a new system(s). The new system label(s) shall include the words "other unidentified systems exist on the premises."

What caused the 2017 NEC Change?
The previous identification requirements for branch circuits supplied from more than one nominal voltage system moved forward for the 2017 *NEC* with a new exception added for relief from identifying each ungrounded conductor for existing installations where a voltage sys-tem(s) already exists and a different voltage system is being added. A new requirement was also added concerning the durability and makeup of the labels.

210.8

Measurements for GFCI Protection

Type of Change: New

Summary of change: New language added to clarify how measurements are to be determined for GFCI receptacle.

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 ~~(D)~~ (E). 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

Informational Note No. 2: See 422.5(A) for GFCI requirements for appliances.

For the purposes of this section, when determining distance from receptacles the distance shall 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.

What caused the 2017 NEC Change?
A new provision was added to 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.

210.8(A)(7)
GFCI Protection at Sinks

Type of Change: Revision

Summary of change: Measurement criteria at dwelling unit sinks were revised for clarity in determination of which receptacles around these sinks would and would not require GFCI protection.

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 ~~(D)~~ (E). 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.

For the purposes of this section, when determining distance from receptacles, the distance shall 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.

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

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

What caused the 2017 NEC Change?
All 125-volt, single-phase, 15- and 20-ampere receptacles installed within 1.8 m (6 ft) of the “top inside edge of the bowl” of any dwelling unit sink (including the kitchen sink) requires GFCI protection without the measurement piercing a floor, wall, ceiling, or fixed barrier, or passing through a door, doorway, or window.

210.8(B)
Three-Phase GFCI Protection

Type of Change: Revision

Summary of change: The GFCI requirements for receptacles at commercial/industrial applications have been expanded to recognize ground faults other than 15 and 20A 125-volt applications only.

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 ~~(D)~~ (E). 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.

For the purposes of this section, when determining distance from receptacles, the distance shall 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.

(B) Other Than Dwelling Units. All ~~125-vol~~t, single-phase, ~~15-and 20-ampere~~ receptacles rated 150 volts to ground or less, 50 amperes or less; and three-phase receptacles rated 150 volts to ground or less, 100 amperes or less, installed in the locations specified in 210.8(B)(1) through ~~(8)~~ (10) shall have ground-fault circuit-interrupter protection for personnel.

What caused the 2017 NEC Change?

The GFCI requirements at "Other Than Dwelling Units" still include coverage of 125-volt, single-phase, 15- and 20-ampere receptacles. These requirements have been expanded to include 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.

210.8(B)(9)
Non-Dwelling Unit Crawl Space

Type of Change: New

Summary of change: GFCI protection for receptacles in non-dwelling unit crawl spaces has been added.

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 ~~(D)~~ (E). 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.

For the purposes of this section, when determining distance from receptacles, the distance shall 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.

(B) Other Than Dwelling Units. All ~~125-vol~~t, single-phase, ~~15- and 20-ampere~~ receptacles rated 150 volts to ground or less, 50 amperes or less; and three-phase receptacles rated 150 volts to ground or less, 100 amperes or less, installed in the locations specified in 210.8(B)(1) through ~~(8)~~ (10) shall have ground-fault circuit-interrupter protection for personnel.

(9) Crawl spaces — at or below grade level

What caused the 2017 NEC Change?
GFCI protection is now 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 non-dwelling unit crawl spaces.

210.8(B)(10)

GFCI Protection for Receptacles in Non-Dwelling Unit Unfinished Basements

Type of Change: New

Summary of change: GFCI protection has been added for receptacles installed in non-dwelling unit unfinished basements.

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 ~~(D)~~ (E). 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.

For the purposes of this section, when determining distance from receptacles, the distance shall 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.

(B) Other Than Dwelling Units. All ~~125-vol~~t, single-phase, ~~15-and 20-ampere~~ receptacles rated 150 volts to ground or less, 50 amperes or less; and three-phase receptacles rated 150 volts to ground or less, 100 amperes or less, installed in the locations specified in 210.8(B)(1) through ~~(8)~~ (10) shall have ground-fault circuit-interrupter protection for personnel. (10) Unfinished portions or areas of the basement not intended as habitable rooms

What caused the 2017 NEC Change?
GFCI protection for receptacles installed in unfinished basements has been expanded to include commercial applications as well as dwelling units. Revisions to the parent text at 210.8(B) has expanded the receptacles involved to those that are 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.

210.8(E)

GFCI Protection for Lighting Outlets in Crawl Spaces

Type of Change: New

Summary of change: GFCI protection for lighting outlets in crawl spaces has been added.

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 ~~(D)~~ (E). 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.

For the purposes of this section, when determining distance from receptacles, the distance shall 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. **(E) Crawl Space Lighting Outlets.** GFCI protection shall be provided for lighting outlets not exceeding 120 volts installed in crawl spaces.

What caused the 2017 NEC Change?
In addition to the GFCI requirements for lighting outlets of the previous *Code*, GFCI protection is now required for lighting outlets not exceeding 120 volts in crawl spaces where space is at or below grade level.

210.11(C)(4)

Garage Branch Circuit(s)

Type of Change: New

Summary of change: New requirement added for minimum rated 120-volt, 20-ampere branch circuit for dwelling unit garage receptacles.

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

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

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

What caused the 2017 NEC Change?
The branch circuit supplying receptacle outlets in dwelling unit garages is now required to be a 120-volt, 20-ampere rated branch circuit. The garage receptacle outlet branch circuit is still prohibited from serving other outlets with the exception of readily accessible receptacles located outdoors.

210.12(C)

AFCI Protection in Guest Rooms and Guest Suites

Type of Change: New

Summary of change: New provisions added requiring AFCI protection for guest rooms/guest suites of hotels/motels.

Code Language: 210.12 Arc-Fault Circuit-Interrupter Protection.
Arc-fault circuit-interrupter protection shall be provided as required in 210.12(A) (B), ~~and~~ (C), and (D). The arc-fault circuit interrupter shall be installed in a readily accessible location.
(C) Guest Rooms and Guest Suites. All 120-volt, single-phase, 15-and 20-ampere branch circuits supplying outlets and devices installed in guest rooms and guest suites of hotels and motels shall be protected by any of the means described in 210.12(A)(1) through (6).

What caused the 2017 NEC Change?
New provisions were added at 210.12(C) requiring AFCI protection for all 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets and devices installed in guest rooms and guest suites of hotels and motels, regardless of the existence of "permanent provisions for cooking" or not.

210.17
Electric Vehicle Branch Circuit

Type of Change: Deletion and Relocation

Summary of change: The requirement for an individual branch circuit for electric vehicle outlets has been relocated from 210.17 to 625.40.

Code Language: ~~**210.17 Electric Vehicle Branch Circuit.**~~ ~~An outlet(s) installed for the purpose of charging electric vehicles shall be supplied by a separate branch circuit. This circuit shall have no other outlets.~~
~~**Informational Note:** See 625.2 for the definition of Electric Vehicle~~.

625.40 Electric Vehicle Branch Circuit. An outlet(s) Each outlet installed for the purpose of charging electric vehicles shall be supplied by a separate an individual branch circuit. This Each circuit shall have no other outlets.

What caused the 2017 NEC Change?
The requirement for a separate branch circuit for electric vehicle outlets was relocated to 625.40, the article for electric vehicle charging systems. During this relocation, the requirement for a "separate" branch circuit was changed to an "individual" branch circuit. There is still no requirement for an outlet to be installed specifically for the purpose of charging of an electric vehicle.

210.52(A)(2)(1)
Receptacle Wall Space

Type of Change: Revision

Summary of change: Fixed cabinets "that do not have countertops or similar work surfaces" was added as an item that will constitute a break in a wall space for receptacle spacing requirements at dwelling units.

Code Language: 210.52 Dwelling Unit Receptacle Outlets
This section provides requirements for 125-volt, 15-and 20-ampere receptacle outlets.
(Remainder of text unchanged.)

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

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

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

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

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

What caused the 2017 NEC Change?
Only "fixed cabinets that do not have countertops or similar work surfaces" are now considered as an item (along with doorways and fireplaces) that would not be counted as "wall space" concerning receptacle spacing and location requirements.

210.52(B)(1), Ex. No. 2
Appliance Branch Circuit

Type of Change: Revision

Summary of change: An individual branch circuit supplying a receptacle outlet for any specific appliance (not just the refrigerator) at a dwelling unit is allowed to be rated 15-ampere or greater.

Code Language: 210.52 Dwelling Unit Receptacle Outlets
This section provides requirements for 125-volt, 15-and 20-ampere receptacle outlets. (Remainder of text unchanged.)

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

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

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

What caused the 2017 NEC Change?
Any specific dwelling unit kitchen appliance is permitted by exception to be supplied from an individual branch circuit rated 15 amperes or greater rather than from one of the 20-ampere rated small-appliance branch circuits.

210.52(C)(3)
Peninsular Countertop Spaces

Type of Change: Revision

Summary of change: The measurement point for peninsular countertops has been changed from the "connecting edge" to the "connected perpendicular wall."

Code Language: 210.52 Dwelling Unit Receptacle Outlets
This section provides requirements for 125-volt, 15- and 20-ampere receptacle outlets.
(*Remainder of text unchanged.*)

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

(3) Peninsular Countertop Spaces. At least one receptacle outlet shall be installed at each peninsular countertop long dimension space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater. A peninsular countertop is measured from the connecting edge connected perpendicular wall.

What caused the 2017 NEC Change?
At least one receptacle outlet is still required at each peninsular countertop with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater, but the measurement is now measured from the "connected perpendicular wall."

210.52(G)

Receptacle for Basements, Garages, and Accessory Buildings

Type of Change: Revision

Summary of change: Receptacle requirements for dwelling unit garages, basements, and accessory buildings expanded to two-family dwellings (not just one-family dwellings).

Code Language: 210.52 Dwelling Unit Receptacle Outlets
This section provides requirements for 125-volt, 15- and 20-ampere receptacle outlets.
(*Remainder of text unchanged.*)

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

What caused the 2017 NEC Change?
The same one receptacle outlet requirement still applies to qualifying basements, garages, and accessory buildings, but this requirement has been extended to two-family dwellings as well as one-family dwellings.

210.52(G)(1)

Dwelling Unit Garages

Type of Change: Revision

Summary of change: At least one receptacle outlet is required to be installed "in each vehicle bay" and not more than 1.7 m ($5^1/_2$ ft) above the floor in dwelling unit garages.

Code Language: 210.52 Dwelling Unit Receptacle Outlets
This section provides requirements for 125-volt, 15- and 20-ampere receptacle outlets.
(Remainder of text unchanged.)

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

(1) Garages. In each attached garage and in each detached garage with electric power,~~. The branch circuit supplying this receptacle(s) shall not supply outlets outside of the garage. At~~ at least one receptacle outlet shall be installed ~~for~~ in each ~~car space~~ vehicle bay and not more than 1.7 m ($5^1/_2$ ft) above the floor.

What caused the 2017 NEC Change?
In each attached garage and in each detached garage with electric power, at least one receptacle outlet is required to be installed "in each vehicle bay and not more than 1.7 m ($5^1/_2$ ft) above the floor." The branch circuit supplying these receptacle(s) cannot serve outlets outside of the garage with the exception of readily accessible receptacles located outdoors. This latter requirement concerning the branch circuit supplying the garage is now located at 210.11(C)(4).

210.64
Receptacle at Electrical Service Areas

Type of Change: Revision

Summary of change: The required receptacle outlets at electrical service equipment must be installed in an accessible location within 7.5 m (25 ft) of indoor electrical service equipment.

Code Language: 210.64 Electrical Service Areas.
At least one 125-volt, single-phase, 15- or 20-ampere-rated receptacle outlet shall be installed in an accessible location within ~~15 m (50 ft)~~ 7.5 m (25 ft) of the indoor electrical service equipment. The required receptacle outlet shall be located within the same room or area as the service equipment.

Exception No. 1: *The receptacle outlet shall not be required to be installed in one-and-two-family dwellings.*

Exception No. 2: *Where the service voltage is greater than 120 volts to ground, a receptacle outlet shall not be required for services dedicated to equipment covered in Articles 675 and 682.*

What caused the 2017 NEC Change?
At least one 125-volt, single-phase, 15- or 20-ampere-rated receptacle outlet is still required to be installed at the electrical service equipment. The maximum distance this receptacle outlet can be located from the electrical service has been shortened to 7.5 m (25 ft) and limited to indoor service equipment only. This required receptacle outlet is now required to be installed in an accessible location and must be located within the same room or area as the service equipment. This requirement is still not applicable to one- and two-family dwellings. A new exception was also added allowing services dedicated to equipment covered in Articles 675 and 682 to be exempt from this requirement when the service voltage is greater than 120 volts to ground.

210.70(C)
Lighting Outlet(s) All Occupancies

Type of Change: Revision

Summary of change: Lighting outlet requirements for storage or equipment spaces added for non-dwelling unit utility rooms and basements.

Code Language: 210.70 Lighting Outlets Required.
Lighting outlets shall be installed where specified in 210.70(A), (B), and (C).

(C) ~~Other Than Dwelling Units~~ **All Occupancies.** For attics and underfloor spaces, ~~containing equipment requiring servicing, such as heating, air-conditioning, and refrigeration equipment~~ utility rooms, and basements, at least one lighting outlet containing a switch or controlled by a wall switch shall be installed ~~in such~~ where these spaces are used for storage or contain equipment requiring servicing. At least one point of control shall be at the usual point of entry to these spaces. The lighting outlet shall be provided at or near the equipment requiring servicing.

- **What caused the 2017 NEC Change?**

The title of 210.70(C) was changed from “Other Than Dwelling Units” to “All Occupancies” and the text at this provision was revised to mirror the *Code* text at 210.70(A)(3) for dwelling units. This lighting outlet requirement for storage or equipment spaces now applies to dwelling units as well as non-dwelling unit attics, underfloor spaces, utility rooms, and basements.

210.71
Receptacle outlets in meeting rooms

Type of Change: New

Summary of Change: Receptable outlet requirements were added for non-dwelling unit meeting room.

Code Language: 210.71 Meeting Rooms.

(A) General. Each meeting room of not more than 93 m^2 (1000 ft^2) in other than dwelling units shall have outlets for nonlocking-type, 125-volt, 15- or 20-ampere receptacles. The outlets shall be installed in accordance with 210.71(B). Where a room or space is provided with movable partition(s), each room size shall be determined with the partition in the position that results in the smallest size meeting room.

Informational Note No. 1: For the purposes of this section, meeting rooms are typically designed or intended for the gathering of seated occupants for such purposes as conferences, deliberations, or similar purposes, where portable electronic equipment such as computers, projectors, or similar equipment is likely to be used.

Informational Note No. 2: Examples of rooms that are not meeting rooms include auditoriums, schoolrooms, and coffee shops.

(B) Receptacle Outlets Required. The total number of receptacle outlets, including floor outlets and receptacle outlets in fixed furniture, shall not be less than as determined in (1) and (2). These receptacle outlets shall be permitted to be located as determined by the designer or building owner.

(1) **Receptacle Outlets in Fixed Walls.** Receptacle outlets shall be installed in accordance with 210.52(A)(1) through (A)(4).

(2) **Floor Receptacle Outlets.** A meeting room that is at least 3.7 m (12 ft) wide and that has a floor area of at least 20 m^2 (215 ft^2) shall have at least one receptacle outlet located in the floor at a distance not less than 1.8 m (6 ft) from any fixed wall for each 20 m2 (215 ft^2) or major portion of floor space.

Informational Note No. 1: See Section 314.27(B) for floor boxes used for receptacles located in the floor.

Informational Note No. 2: See Article 518 for assembly occupancies designed for 100 or more persons.

What caused the 2017 NEC Change?
New provisions were added at 210.71 with minimum provisions for receptacle outlets placement and wall spacing requirements in non-dwelling unit meeting rooms such as those found at hotels and convention centers. See *NEC* text for complete requirements and specifics.

215.2(A)(1)(a), Ex. No. 2
Feeder Rating and Size

Type of Change: New

Summary of change: A new exception allows a portion of a feeder that is not connected directly to load terminations to have an allowable ampacity not less than the sum of the continuous load plus the noncontinuous load (rather than the noncontinuous load plus 125 percent of the continuous load). It also clarifies when correction factors are to be applied.

Code Language: 215.2 Minimum Rating and Size.

Feeders Not More Than 600 Volts.

General. Feeder conductors shall have an ampacity not less than required to supply the load as calculated in Parts III, IV, and V of Article 220. Conductors shall be sized to carry not less than the larger of 215.2(A)(1) or (b).

Where a feeder supplies continuous loads or any combination of continuous and noncontinuous loads, the minimum feeder conductor size shall have an allowable ampacity not less than the noncontinuous load plus 125 percent of the continuous load.

Exception No. 1: *If the assembly, including the overcurrent devices protecting the feeder(s), is listed for operation at 100 percent of its rating, the allowable ampacity of the feeder conductors shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load.*

Exception No. 2: *Where a portion of a feeder is connected at both its supply and load ends to separately installed pressure connections as covered in **1** 0.14(C)(2), it shall be permitted to have an allowable ampacity not less than the sum of the continuous load plus the noncontinuous load. No portion of a feeder installed under the provisions of this exception shall extend into an enclosure containing either the feeder supply or the feeder load terminations, as covered in **1** 0.14(C)(1).*

Exception No. 3: *Grounded conductors that are not connected to an overcurrent device shall be permitted to be sized at 100 percent of the continuous and noncontinuous load.*

(a) The minimum feeder conductor size shall have an allowable ampacity not less than the maximum load to be served after the application of any adjustment or correction factors.

[(3) Informational Notes unchanged]

~~***Exception No. 1:** If the assembly, including the overcurrent devices protecting the feeder(s), is listed for operation at 100 percent of its rating, the allowable ampacity of the feeder conductors shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load*~~.

~~***Exception No. 2:** Grounded conductors that are not connected to an overcurrent device shall be permitted to be sized at 100 percent of the continuous and noncontinuous load*~~.

What caused the 2017 NEC Change?
The previous exceptions to 215.2(A)(1)(b) have been relocated after 215.2(A)(1)(a). This relocation clarifies that these exceptions apply to the main rule that the feeder conductors must have an allowable ampacity of not less than the noncontinuous load plus 125 percent of the continuous load. A new exception was also added that allows a portion of a feeder that is connected at both its supply and load ends to separately installed pressure connections to have an allowable ampacity not less than the sum of the continuous load plus the noncontinuous load (rather than the noncontinuous load plus 125 percent of the continuous load).

Article 220 and 220.1

Branch-Circuit, Feeder, and Service Load Calculations

Type of Change: Revision

Summary of change: The Title and Scope of Article 220 were revised to enhance clarity of what is covered by the article.

Code Language: Article 220 Branch-Circuit, Feeder, and Service Load Calculations

220.1 Scope. This article provides requirements for calculating branch-circuit, feeder, and service loads. Part I provides for general requirements for calculation methods. Part II provides calculation methods for branch-circuit loads. Parts III and IV provide calculation methods for ~~feeders~~ feeder and ~~services~~ service loads. Part V provides calculation methods for ~~farms~~ farm loads.

Informational Note No. 1: See examples in Informative Annex D.

Informational Note No. 2: See Figure 220.1 for information on the organization of Article 220.

What caused the 2017 NEC Change?
The title of Article 220 was changed to "Branch Circuit, Feeder, and Service 'Load' Calculations." Parts of the scope of the article were changed to clarify that Parts III and IV provide calculation methods for "feeder and service loads." Text concerning Part V was revised to clarify that this part of the article covers calculation methods for "farm loads."

First Revisions: FR 343, FR 342
Public Inputs: PI 695

225.30(F)

Multiple Feeders in One- or Two-Family Dwellings

Type of Change: New

Summary of change: Multiple feeders are now allowed to enter a one-or two-family dwelling under certain restrictions, which include that the feeder disconnects at the building served must be grouped.

Code Language: 225.30 Number of Supplies. (Outside Branch Circuits and Feeders)

A building or other structure that is served by a branch circuit or feeder on the load side of a service disconnecting means shall be supplied by only one feeder or branch circuit unless permitted in 225.30(A) through ~~(E)~~ (F). For the purpose of this section, a multiwire branch circuit shall be considered a single circuit.

Where a branch circuit or feeder originates in these additional buildings or other structures, only one feeder or branch circuit shall be permitted to supply power back to the original building or structure, unless permitted in 225.30(A) through ~~(E)~~(F).

(F) One- or Two-Family Dwelling Unit(s). For a one- or two- family dwelling unit(s) with multiple feeders, it shall be permissible to install not more than six disconnects grouped at one location where the feeders enter the building, provided the feeder conductors originate at the same switchboard, panelboard, or overcurrent protective device location.

What caused the 2017 NEC Change?
A new first level subdivision (F) was added to 225.30 that will allow multiple feeders at one- or two-family dwelling unit(s) with not more than six grouped disconnecting means. These feeder conductor(s) are to originate at the same switchboard, panelboard, or overcurrent protective device location.

230.24(B)(5)

Clearance for Overhead Service Conductors

Type of Change: New

Summary of change: New vertical clearance of 7.5 m (24.5 ft) added for overhead service conductors installed over railroad tracks.

Code Language: 230.24 Clearances.
Overhead service conductors shall not be readily accessible and shall comply with 230.24(A) through (E) for services not over 1000 volts, nominal.

(B) Vertical Clearance for Overhead Service Conductors. Overhead service conductors, where not in excess of 600 volts, nominal, 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 (24.5 ft) over tracks of railroads

What caused the 2017 NEC Change?
A new vertical clearance of 7.5 m (24.5 ft) was added at 230.24(B)(5) for overhead service conductors installed over the tracks of a railroad. This will coordinate with the same requirement for outside overhead branch circuits and feeders in Article 225.

230.29

Supports over Buildings.

Type of Change: New

Summary of change: New requirement added for bonding of metal overhead service support structures over buildings.

Code Language: 230.29 Supports over Buildings.
Service conductors passing over a roof shall be securely supported by substantial structures. For a grounded system, where the substantial structure is metal, it shall be bonded by means of a bonding jumper and listed connector to the grounded overhead service conductor. ~~The bonding jumper shall be of the same conductor size and material as the grounded overhead service conductor, and in no case smaller than mandated in 250.102(C) (1) based on the size of the ungrounded service conductors~~. Where practicable, such supports shall be independent of the building.

What caused the 2017 NEC Change?
Metal support structures that support overhead service conductors installed over a roof are now required to be bonded to the grounded overhead service conductor.

Table 240.6(A)

Standard Ampere Ratings for Fuses and Inverse Time Circuit Breakers

The standard ampere ratings for fuses and inverse time circuit breakers shall be considered as shown in Table 240.6(A)

15	20	25	30	35
40	45	50	60	70
80	90	100	110	125
150	175	200	225	250
300	350	400	450	500
600	700	800	1000	1200
1600	2000	2500	3000	4000
5000	6000			

Additional standard ampere ratings for fuses shall be 1, 3, 6, 10, and 601

The use of fuses and inverse time circuit breakers with nonstandard ampere ratings shall be permitted

Table 240.6(A) Standard Ampere Ratings

Type of Change: New

Summary of change: New Table 240.6(A) added for "Standard Ampacity Ratings for Fuses and Inverse Time Circuit Breakers."

Code Language: 240.6 Standard Ampere Ratings.

Fuses and Fixed-Trip Circuit Breakers. The standard ampere ratings for fuses and inverse time circuit breakers shall be considered ~~15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000, 1200, 1600, 2000, 2500, 3000, 4000, 5000, and 6000 amperes~~ as shown in Table 240.6(A). Additional standard ampere ratings for fuses shall be 1, 3, 6, 10, and 601. The use of fuses and inverse time circuit breakers with nonstandard ampere ratings shall be permitted.

Table 240.6(A) Standard Ampere Ratings for Fuses and Inverse Time Circuit Breakers
(See *NEC* and illustration provided for complete table)

What caused the 2017 NEC Change?
The standard ampere ratings for fuses and inverse time circuit breakers have been revised to be included in a list format located at new Table 240.6(A).

240.67
Arc Energy Reduction

Type of Change: New

Summary of change: New arc energy reduction requirements have been added for fuses rated 1200 amperes or higher.

Code Language: 240.67 Arc Energy Reduction.
Where fuses rated 1200 amperes or higher are installed, 240.67(A) and (B) shall apply. This requirement shall become effective January 1, 2020.
(A) Documentation. Documentation shall be available to those authorized to design, install, operate, or inspect the installation as to the location of the fuses.

(A) Method to Reduce Clearing Time. A fuse shall have a clearing time of 0.07 seconds or less at the available arcing current, or one of the following shall be provided:
(1) Differential relaying
(2) Energy-reducing maintenance switching with local status indicator
(3) Energy-reducing active arc flash mitigation system
(4) An approved equivalent means

Informational Note No. 1: An energy-reducing maintenance switch allows a worker to set a disconnect switch to reduce the clearing time while the worker is working within an arc-flash boundary as defined in NFPA 70E-2015, *Standard for Electrical Safety in the Workplace*, and then to set the disconnect switch back to a normal setting after the potentially hazardous work is complete.

Informational Note No. 2: An energy-reducing active arc flash mitigation system helps in reducing arcing duration in the electrical distribution system. No change in the disconnect switch or the settings of other devices is required during maintenance when a worker is working within an arc flash boundary as defined in NFPA 70E-2015, *Standard for Electrical Safety in the Workplace.*

Informational Note No. 3: IEEE 1584, *IEEE Guide for Performing Arc Flash Hazard Calculations*, is one of the available methods that provides guidance in determining arcing current.

What caused the 2017 NEC Change?
Comparable methods of incident energy reduction as that of 240.87 have been introduced into the 2017 *NEC* at 240.67 for fuses rated at 1200 amperes and greater.

250.22(6)
Circuits Not to Be Grounded

Type of Change: New

Summary of change: Class 2 load-side circuits for suspended ceiling low-voltage power grid distribution systems were added to the list of circuits not to be grounded.

Code Language: 250.22 Circuits Not to Be Grounded.
The following circuits shall not be grounded:
(1) Circuits for electric cranes operating over combustible fibers in Class III locations, as provided in 503.155
(2) Circuits in health care facilities as provided in 517.61 and 517.160
(3) Circuits for equipment within electrolytic cell working zone as provided in Article 668
(4) Secondary circuits of lighting systems as provided in 411.6(A)
(5) Secondary circuits of lighting systems as provided in 680.23(A)(2)
(6) Class 2 load-side circuits for suspended ceiling low-voltage power grid distribution systems as provided in 393.60(B).

What caused the 2017 NEC Change?
A new List Item (6) was added to 250.22 for circuits not to be grounded with the addition of Class 2 load-side circuits for suspended ceiling low-voltage power grid distribution systems as provided in 393.60(B).

250.30(A)(4) and (A)(5)
Grounding Separately Derived Systems

Type of Change: Revision

Summary of change: The use of metal water piping or building steel as the first options as a grounding electrode system for a separately derived system has been removed.

Code Language: 250.30 Grounding Separately Derived Alternating-Current Systems.
In addition to complying with 250.30(A) for grounded systems, or as provided in 250.30(B) for ungrounded systems, separately derived systems shall comply with 250.20, 250.21, 250.22, or 250.26, as applicable. Multiple separately derived systems that are connected in parallel shall be installed in accordance with 250.30.

(A) Grounded Systems. A separately derived ac system that is grounded shall comply with 250.30(A)(1) through (A)(8). Except as otherwise permitted in this article, a grounded conductor shall not be connected to normally non-current-carrying metal parts of equipment, be connected to equipment grounding conductors, or be reconnected to ground on the load side of the system bonding jumper.

Informational Note: See 250.32 for connections at separate buildings or structures and 250.142 for use of the grounded circuit conductor for grounding equipment.

Exception: *Impedance grounded neutral system grounding connections shall be made as specified in 250.36 or 250.187, as applicable.*

(3) **Grounding Electrode.** The building or structure grounding electrode system shall be used as the grounding electrode for the separately derived system. If located outdoors, the grounding electrode shall be in accordance with 250.30(C). ~~as near as practicable to, and preferably in the same area as, the grounding electrode conductor connection to the system. The grounding electrode shall be the nearest of one of the following:~~
~~(1) Metal water pipe grounding electrode as specified in 250.52(A)(1)~~
~~(2) Structural metal grounding electrode as specified in 250.52(A)(2)~~ ~~***Exception No. 1:*** *Any of the other electrodes identified in 250.52(A) shall be used if the electrodes specified by 250.30(A)(4) are not available*~~.

Exception ~~***No. 2 to (1) and (2):***~~ *If a separately derived system originates in equipment that is listed and identified* ~~equipmen~~t *as suitable for use as service equipment, the grounding electrode used for the service or feeder equipment shall be permitted to be used as the grounding electrode for the separately derived system.*

Informational Note No. 1: See 250.104(D) for bonding requirements for interior metal water piping in the area served by separately derived systems.

Informational Note No. 2: See 250.50 and 250.58 for requirements for bonding all electrodes together if located at the same building or structure.

(5) Grounding Electrode Conductor, Single Separately Derived System. A grounding electrode conductor for a single separately derived system shall be sized in accordance with 250.66 for the derived ungrounded conductors. It shall be used to connect the grounded conductor of the derived system to the grounding electrode ~~as specified~~ in accordance with 250.30(A)(4), or as permitted in 250.68(C)(1) and (2). This connection shall be made at the same point on the separately derived system where the system bonding jumper is connected.
[See NEC text for Exception No. 1, 2, and 3 to 250.30(A)(5)]

What caused the 2017 NEC Change?
For the 2017 *NEC*, any of the building or structure grounding electrode(s) that are present can now be used as the grounding electrode(s) for a separately derived system. The grounding electrode(s) for the separately derived system do not have to be located near the grounding electrode conductor connection. The metal water piping and the structural metal frame as covered in 250.68(C)(1) and (2) have been recognized as conductors to extend the grounding electrode connection at 250.30(A)(5).

50.30(A)(6)(a)
Common GE Conductor

Type of Change: New and Revision

Summary of change: A metal water pipe was added to the methods of achieving a common grounding electrode conductor permitted for multiple separately derived systems.

Code Language: 250.30 Grounding Separately Derived Alternating-Current Systems
In addition to complying with 250.30(A) for grounded systems, or as provided in 250.30(B) for ungrounded

systems, separately derived systems shall comply with 250.20, 250.21, 250.22, or 250.26, as applicable. Multiple separately derived systems that are connected in parallel shall be installed in accordance with 250.30.

(A) Grounded Systems. A separately derived ac system that is grounded shall comply with 250.30(A)(1) through (A)(8). Except as otherwise permitted in this article, a grounded conductor shall not be connected to normally non-current-carrying metal parts of equipment, be connected to equipment grounding conductors, or be reconnected to ground on the load side of the system bonding jumper.

Informational Note: See 250.32 for connections at separate buildings or structures and 250.142 for use of the grounded circuit conductor for grounding equipment.

Exception: *Impedance grounded neutral system grounding connections shall be made as specified in 250.36 or 250.187, as applicable.*

(6) Grounding Electrode Conductor, Multiple Separately Derived Systems. A common grounding electrode conductor for multiple separately derived systems shall be permitted. If installed, the common grounding electrode conductor shall be used to connect the grounded conductor of the separately derived systems to the grounding electrode as specified in 250.30(A)(4). A grounding electrode conductor tap shall then be installed from each separately derived system to the common grounding electrode conductor. Each tap conductor shall connect the grounded conductor of the separately derived system to the common grounding electrode conductor. This connection shall be made at the same point on the separately derived system where the system bonding jumper is connected.

Exception No. 1: (No change-see *NEC* for complete text)

Exception No. 2: (No change-see *NEC* for complete text)

(a) Common Grounding Electrode Conductor. The common grounding electrode conductor shall be permitted to be one of the following:

(1) A conductor of the wire type not smaller than 3/0 AWG copper or 250 kcmil aluminum

(2) A metal water pipe that complies with 250.68(C)(1)

(3) The metal structural frame of the building or structure that complies with ~~250.52(A)(2)~~ 250.68(C)(2) or is connected to the grounding electrode system by a conductor ~~that shall~~ not ~~be~~ smaller than 3/0 AWG copper or 250 kcmil aluminum

What caused the 2017 NEC Change?

A metal water pipe that complies with 250.68(C)(1) was added to the allowable methods for a common grounding electrode conductor for multiple separately derived systems. Revisions were also made to the provisions of a metal structural frame of a building or structure qualifying as a common grounding electrode conductor for multiple separately derived systems.

250.52(A)(2)

Metal In-Ground Support Structures

Type of Change: Revision

Summary of change: The title of a "Metal Frame of a Building" grounding electrode renamed "Metal In-Ground Support Structure." Conditions for this grounding electrode revised.

Code Language: 250.52 Grounding Electrodes.

(A) Electrodes Permitted for Grounding.

(2) Metal ~~Frame of the Building or~~ In-Ground Support Structure(s). ~~The metal frame of the building or structure that is connected to the earth by one or more of the following methods:~~
~~(1) At leas~~t One or more structural metal in-ground support structure(s) ~~member that is~~ 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.
~~(2) Hold-down bolts securing the structural steel column that are connected to a concrete-encased electrode that complies with 250.52(A)(3) and is located in the support footing or foundation. The hold-down bolts shall be connected to the concrete-encased electrode by welding, exothermic welding, the usual steel tie wires, or other approved means~~.

Informational Note: Metal in-ground support structures include, but are not limited to, pilings, casings, and other structural metal.

What caused the 2017 NEC Change?
The title of 250.52(A)(2) was changed from "Metal Frame of a Building" to "Metal In-Ground Support Structure." Only one item remains that would qualify as a "metal in-ground support structure" grounding electrode: an in-ground support structure that is in direct contact with the earth vertically for 3.0 m (10 ft) or more, with or without concrete encasement.

250.52(B)(3)
Not Permitted for Use as Grounding Electrodes

Type of Change: New

Summary of change: In-ground swimming pool structures are not permitted to be used as a grounding electrode.

Code Language: 250.52 Grounding Electrodes.

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 reinforcing steel described in 680.26(B) (1) and (B)(2)

Informational Note: See 250.104(B) for bonding requirements of gas piping.

What caused the 2017 NEC Change?
A third item was added to the list of objects that are prohibited from being used as a grounding electrode defined at 250.52(B). The structures and structural reinforcing steel of an in-ground swimming pool as described in 680.26(B)(1) and (B)(2) are now prohibited from being used as a grounding electrode, as well as the two items identified in the previous edition of the *Code.*

250.66(A), (B), and (C)
Size of GECs

Type of Change: Revision

Summary of change: The "sole connection" language for sizing of grounding electrode conductors for connection to specific grounding electrodes has been removed and revised.

Code Language: 250.66 Size of Alternating-Current Grounding Electrode Conductor.
The size of the 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 of a grounded or ungrounded ac system shall not be less 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). ~~Where~~ If the grounding electrode conductor or bonding jumper ~~is~~ connected to a single or multiple rod, pipe, or plate electrode(s), or any combination thereof, as ~~permitted~~ described in 250.52(A)(5) or (A)(7), ~~that portion of the conductor that is the sole connection to the grounding electrode(s)~~ 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 wire.

(B) Connections to Concrete-Encased Electrodes. ~~Where~~ If the grounding electrode conductor or bonding jumper ~~is~~ connected to a single or multiple concrete-encased electrode(s) as ~~permitted~~ described in 250.52(A)(3), that portion of the conductor that is the sole connection to the grounding electrode(s) 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 4 AWG copper wire.

(C) Connections to Ground Rings. ~~Where~~ If the grounding electrode conductor or bonding jumper ~~is~~ connected to a ground ring as ~~permitted~~ described in 250.52(A)(4), ~~that portion of the conductor that is the sole connection to the grounding electrode~~ 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 the conductor used for the ground ring.

What caused the 2017 NEC Change?
The sizing requirements of 250.66(A), (B), and (C) are still the same as the previous edition of the *Code*, but the "sole connection" requirement in all three subsections was replaced with language indicating that a grounding electrode conductor that does not extend to other types of electrodes requiring a larger size conductor still qualifies for the smaller size conductors (instead of the size spelled out in Table 250.66).

250.94(A) and (B)

Intersystem Bonding Terminations

Type of Change: Revision and New

Summary of change: The title of this section was renamed "Bonding for Communication Systems" and a new 250.94(B) was added titled "Other Means" allowing an alternate connection option to be made on a common bus bar.

Code Language: 250.94 Bonding for ~~Other~~ Communication Systems. Communications system bonding terminations shall be connected in accordance with (A) or (B).

(A) The Intersystem Bonding Termination Device. An intersystem bonding termination (IBT) for connecting intersystem bonding conductors ~~required for other systems~~ shall be provided external to enclosures at the service equipment or metering equipment enclosure and at the disconnecting means for any additional buildings or structures. The intersystem ~~bonding termination~~ If an IBT is used, it shall comply with the following: (Remainder of 250.94(A) unchanged. See *NEC* for complete text.)

(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 sufficient 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).

Exception to (A) and (B): *Means for connecting intersystem bonding conductors are not required where communications systems are not likely to be used.*

Informational Note: The use of an IBT can reduce electrical noise on communication systems.

What caused the 2017 NEC Change?

The title of the section was changed to "Bonding for Communication Systems." The existing text for the intersystem bonding termination was placed under List Item (A) and titled, "The Intersystem Bonding Termination Device." The six conditions that must be met to qualify as an intersystem bonding termination have not changed, and the one exception for existing buildings or structures remains the same. A new 250.94(B) was added titled, "Other Means," which permits intersystem bonding connections to an aluminum or copper busbar that will accommodate at least three terminations for communication systems as well as "other connections." A new exception was added for 250.94(A) and (B) offering relief from an intersystem bonding connection means "where communications systems are not likely to be used."

250.102

Grounded Conductors, Bonding Conductors, and Jumpers

Type of Change: Revision

Summary of change: Title changed to *"Grounded Conductors*, Bonding Conductors, and Jumpers" which more clearly reflects what this section covers.

Code Language: 250.102 Grounded Conductors, Bonding Conductors, and Jumpers.

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

(A) Attachment. (Text unchanged, see *NEC* for complete text.)

(B) Size — Supply-Side Bonding Jumper.

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

(2) Size for Parallel Conductor Installations in Two or More Raceways or Cables. (Text unchanged, see *NEC* for complete text.)

(C) Size — Equipment Bonding Jumper on Load Side of an Overcurrent Device. (Text unchanged, see *NEC* for complete text.)

(D) Installation.

(1) Inside a Raceway or an Enclosure. (Text unchanged, see *NEC* for complete text.)

(2) Outside a Raceway or an Enclosure. (Text unchanged, see *NEC* for complete text.)

(3) Protection. (Text unchanged, see *NEC* for complete text.)

What caused the 2017 NEC Change?

"Grounded Conductor" was added to the title of 250.102 to reflect more accurately what the section addresses.

250.122(F)
EGCs Installed in Parallel

Type of Change: Revision and New

Summary of change: Revision and new text added to clarify how to size and install equipment grounding conductors when installed in parallel in a single or multiple raceways, multiconductor cable, auxiliary gutter, or cable tray.

Code Language: 250.122 Size of Equipment Grounding Conductors. (F) Conductors in Parallel. ~~Where conductors are installed in~~ For circuits of parallel conductors ~~in multiple raceways or cables~~ as permitted in 310.10(H), the equipment grounding conductors, ~~where used~~, shall be installed in parallel in accordance with (1) or (2): ~~each raceway or cable~~.

(1) **Conductor Installations in Raceways, Auxiliary Gutters, or Cable Trays. (a) Single Raceway or Cable Tray.** If ~~Where~~ conductors are installed in parallel in the same raceway, ~~cable~~, or cable tray ~~as permitted in 310.10(H)~~, a single wire-type conductor shall be permitted as the equipment grounding conductor ~~shall be permitted. Each~~ The wire-type equipment grounding conductor shall be sized in ~~accordance~~ compliance with 250.122, based on the overcurrent protective device for the feeder or branch circuit. Wire-type equipment grounding conductors installed in cable trays shall meet the minimum requirements of 392.10(B)(1)(c). Metal raceways or auxiliary gutters in accordance with 250.118 or cable trays complying with 392.60(B) shall be permitted as the equipment grounding conductor.

(b) Multiple Raceways. If conductors are installed in parallel in multiple raceways, wire-type equipment grounding conductors, where used, shall be installed in parallel in each raceway. The equipment grounding conductor installed in each raceway shall be sized in compliance with 250.122 based on the overcurrent protective device for the feeder or branch circuit. Metal raceways or auxiliary gutters in accordance with 250.118 or cable trays complying with 392.60(B) shall be permitted as the equipment grounding conductor.

(2) **Multiconductor Cables (a)** If multiconductor cables are installed in parallel, the equipment grounding conductor(s) in each cable shall be connected in parallel. Except as provided in 250.122(F)(2)(b) for raceway or cable tray installations, the equipment grounding conductor in each multiconductor cable shall be sized in accordance with 250.122 based on the overcurrent protective device for the feeder or branch circuit. **(b)** If multiconductor cables are installed in parallel in the same raceway, auxiliary gutter, or cable tray, a single equipment grounding conductor that is sized in accordance with 250.122 shall be permitted in combination with the equipment grounding conductors provided within the multiconductor cables and shall all be connected together. Equipment grounding conductors installed in cable trays shall meet the minimum requirements of 392.10(B)(1)(c). Cable trays complying with 392.60(B), metal raceways in accordance with 250.118, or auxiliary gutters, shall be permitted as the equipment grounding conductor.

What caused the 2017 NEC Change?
In addition to the existing rules for equipment grounding conductors installed in parallel in multiple raceways or cables and the same raceway, cable, or cable tray, these rules for parallel installations were revised to allow equipment grounding conductors installed as part of a multiconductor cable to be used in combination with a separate equipment grounding conductor in a raceway, cable tray or auxiliary gutter. The requirements for 250.122(F) have been expanded into two separate Second Level Subdivisions (1) and (2) with third level subdivisions for each.

250.148
Continuity and Attachment of EGC to Boxes

Type of Change: Revision

Summary of change: Revision to clarify that all equipment grounding conductors associated with any and all circuits in the box must be connected together and to the box and not just each equipment grounding conductors of each associated circuit.

Code Language: 250.148 Continuity and Attachment of Equipment Grounding Conductors to Boxes.

~~Where~~ If circuit conductors are spliced within a box, or terminated on equipment within or supported by a box, ~~any~~ all equipment grounding conductor(s) associated with any of those circuit conductors shall be connected within the box or to the box with devices suitable for the use in accordance with 250.8 and 250.148(A) through (E).

Exception: *The equipment grounding conductor permitted in 250.146(D) shall not be required to be connected to the other equipment grounding conductors or to the box.*

What caused the 2017 NEC Change?
Clear directions in 250.148 specify that all of the equipment grounding conductors present in a box or enclosure are required to be connected, regardless of the circuit with which they are associated. The existing exception to 250.148 still applies, giving relief to the equipment grounding conductor of an isolated ground circuit for an isolated ground receptacle not being required to be connected to the other equipment grounding conductors or the box.

250.187(B)
Impedance Grounded Neutral Systems

Type of Change: Revision

Summary of change: Neutral conductor for an impedance grounded neutral system over 1000 volts must be insulated to the maximum neutral voltage rather than the same insulation as the phase conductors.

Code Language: 250.187 Impedance Grounded Neutral Systems.

Impedance grounded neutral systems in which a grounding impedance, usually a resistor, limits the ground-fault current shall be permitted where all of the following conditions are met:
The conditions of maintenance and supervision ensure that only qualified persons service the installation.
Ground detectors are installed on the system.
Line-to-neutral loads are not served.
Impedance grounded neutral systems shall comply with the provisions of 250.187(A) through (D).

(B) Identified and Insulated. The neutral conductor ~~of an impedance grounded neutral system shall be~~

~~identified, as well as fully insulated with the same insulation as the phase conductors~~. shall comply with both of the following:

(1) The neutral conductor shall be identified.

(2) The neutral conductor shall be insulated for the maximum neutral voltage.

Informational Note: The maximum neutral voltage in a three-phase wye system is 57.7 percent of the phase-to-phase voltage.

What caused the 2017 NEC Change?

The neutral conductor of an impedance grounded neutral system still must be identified, but it must be insulated to the maximum neutral voltage rather than fully insulated with the same insulation as the phase conductors.