Overview of Changes to the 2014 NEC

Frank Gladwin, Licensed Building Official
Electrical Inspector, West Haven
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Related Building Codes

Connecticut State Building Code
2003 International Building Code
2009 International Residential Code
2003 International Existing Building Code
2003 International Mechanical Code
2003 International Plumbing Code
2009 International Energy Conservation Code
2011 National Electrical Code
ICC/ANSI A117.1-2003 Accessible and Usable Buildings and Facilities

Independent Electrical Contractors of New England
Empowering Electricians Since 1969

History of the SBC Regarding the NEC

Effective Date	NEC Edition	Title of Code
9/1/71 – 8/31/81	1971 as of 4/1974 1975 as of 11/10/77	SCBC 1971
9/1/81 – 4/14/87	1976	SCBBC 1978
4/15/87 – 10/15/89	1987	1987 SBC
10/16/89 – 6/14/94	1987	1989 SBC
6/15/94 – 4/30/99	1993	1994 SBC
5/1/99 – 8/31/04	1999	1999 SBC w/2000 Amd
9/1/04 – 12/30/05	2002	1999 SBC w/2000 & 2004 Amd
12/31/2005	2005	2005 SBC
2/28/14 - ?	2011	2005 SBC w/2013 Amd

A look at Article 90, Chapters 1, and 2 and four new Articles

90.1 Purpose

The intent of this section is to establish a clear and definite relationship with the NEC and the electrical system design as well as field installations.

Chapter 1

Article 100 Definitions; this Article covers the essential definitions required to properly apply the provisions of the NEC.

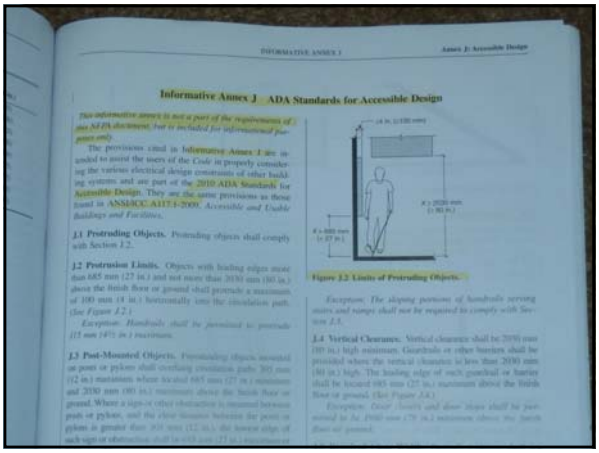
Article 110 Requirements for Electrical Installations; that provides a variety of general regulations that govern the installation of equipment and conductors.

Chapter 2

Article 200 Use and Identification of Grounded Conductors

Article 210 Branch Circuits

- Four New Articles
- Article 393 Low-Voltage Suspended Ceiling Power Distribution Systems
- Article 646 Modular Data Centers
- Article 728 Fire-Resistive Cable Systems
- Article 750 Energy Management Systems



INFORMATIVE ANNEX J — Annex J: Accessible Design

Informative Annex J ADA Standards for Accessible Design

This informative annex is not a part of the requirements of this NFPA document, but is included for informational purposes only.

The provisions cited in Informative Annex J are intended to assist the users of the *Code* in properly considering the various electrical design constraints of other building systems and are part of the 2010 ADA Standards for Accessible Design. They are the same provisions as those found in ANSI/ICC A117.1-2009, *Accessible and Usable Buildings and Facilities*.

J.1 Protruding Objects. Protruding objects shall comply with Section J.2.

J.2 Protrusion Limits. Objects with leading edges more than 685 mm (27 in.) and not more than 2030 mm (80 in.) above the finish floor or ground shall protrude a maximum of 100 mm (4 in.) horizontally into the circulation path. (See Figure J.2.)

Exception: Handrails shall be permitted to protrude 115 mm (4½ in.) maximum.

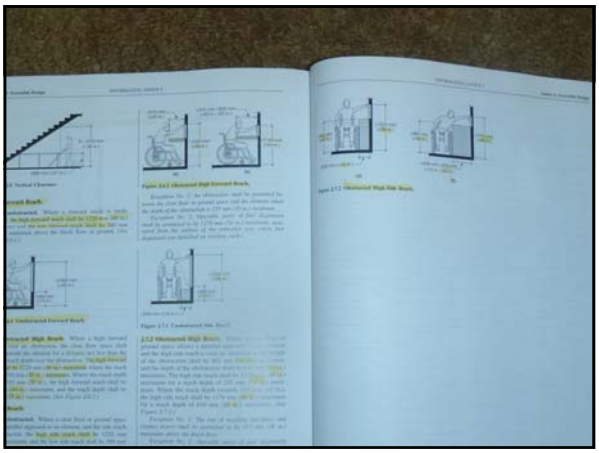
J.3 Post-Mounted Objects. Protruding objects mounted on posts or pylons shall overhang circulation paths 305 mm (12 in.) maximum where located 685 mm (27 in.) minimum and 2030 mm (80 in.) maximum above the finish floor or ground. Where a sign or other obstruction is mounted between posts or pylons, and the clear distance between the posts or pylons is greater than 305 mm (12 in.), the lowest edge of such sign or obstruction shall be 685 mm (27 in.) maximum

Figure J.2 Limits of Protruding Objects.

Exception: The sloping portions of handrails serving stairs and ramps shall not be required to comply with Section J.5.

J.4 Vertical Clearance. Vertical clearance shall be 2030 mm (80 in.) high minimum. Guardrails or other barriers shall be provided where the vertical clearance is less than 2030 mm (80 in.) high. The leading edge of such guardrail or barrier shall be located 685 mm (27 in.) maximum above the finish floor or ground. (See Figure J.4.)

Exception: Door closers and door stops shall be permitted to be 1980 mm (78 in.) minimum above the finish floor or ground.



Code-Wide Changes

- There were approximately **3,745** proposals and **1,625** public comments submitted for modifications to the 2014 edition of the *NEC*.
- **Field-Applied Hazard Markings.** 110.21(B) was added to include specific requirements for warning labels and similar markings where required or specified elsewhere in the *Code*.
- **Lockable Disconnecting Means.** New 110.25 was added to deliver a "one-stop" location providing consistent requirements for a lockable disconnecting means.
- **Requirements for dc Systems Integrated Throughout *NEC*.** Direct current (dc) applications are experiencing a re-emergence because of such things as electric vehicle charging, solar photovoltaic (PV) systems, microgrids, wind-generated electric systems, etc.

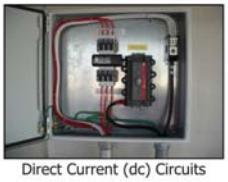
Code-Wide Changes *(cont.)*

- **"Switchgear" Incorporated Throughout the *NEC*.** The previous definition for "Metal-Enclosed Power Switchgear" was modified and retitled to simply "Switchgear" to make it inclusive of all types of switchgear under the purview of the *NEC*.
- **Definitions Relocated to Article 100.** Several existing definitions which appeared in the definitions of a particular article have been relocated to Article 100 as these terms are also found in other articles, not just the article where the previous definition was located.
- **600 Volts to 1000 Volts.** Numerous changes throughout the *NEC* from the 600 volts threshold to 1000 volts.
- **New Articles.** Four new articles added to the 2014 *NEC*.

Code-Wide Changes

Field-Applied Hazard Markings


Lockable Disconnecting Means


Direct Current (dc) Circuits


Switchgear

Section 110.21 Marking

- (A) Manufacture's Markings
- (B) Field-Applied Hazard Markings: (1) The marking shall adequately warn of the hazard (2) The label shall be permanently affixed to the equipment or wiring method and shall not be hand written (3) The label shall be of sufficient durability to withstand the environment

110.21(B) Field-Applied Hazard Markings

- DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

- WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

- CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

110.21(B) Field-Applied Hazard Markings

Hazard markings, signs or labels should meet the requirements in ANSI Z535.4 for suitable font sizes, words, colors, symbols and location requirements for labels

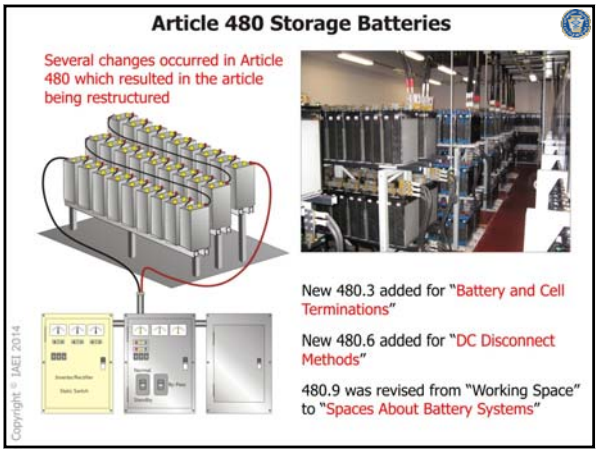
Section 110.25
Lockable Disconnecting Means

This universal rule will apply throughout the code. In almost 50 locations this verbiage has been withdrawn in favor of a reference to this rule.

Example: 600.6(A)(3)(3) The disconnecting means shall be designed such that no pole can be operated independently and shall be lockable in accordance with 110.25

Requirements for DC Systems

- Article 480 Storage Batteries; The rules for storage batteries have been apart of the NEC since its inception in 1897.
- Article 690 Solar Photovoltaic, Part VIII Storage Batteries
- Article 700 Emergency Systems, Part III Sources of Power, 700.12(A) Storage Battery
- Article 701 Legally Required Standby System, Part III Sources of Power, 701.12(A) Storage Battery



Article 100 Definitions

- Switchgear; this term replaces the former term “Metal-Enclosed Power Switchgear”. Switchgear rated over 1000 Volts may be identified as “metal-enclosed switchgear”. The generic term can be used in most code text where the term switchboard is already mentioned.

Article 100 Definitions: Switchgear

- ~~**Metal-Enclosed Power**~~ **Switchgear.** An assembly completely enclosed on all sides and top with sheet metal (except for ventilating openings and inspection windows) and containing primary power circuit switching, interrupting devices, or both, with buses and connections. The assembly may include control and auxiliary devices. Access to the interior of the enclosure is provided by doors, removable covers, or both.
- **Informational Note:** All switchgear subject to *NEC* requirements is metal enclosed. Switchgear rated 1000 volts or less may be identified as “Low-Voltage Power Circuit Breaker Switchgear”. Switchgear rated over 1000 volts may be identified as “Metal-Enclosed Switchgear” or “Metal-Clad Switchgear”. Switchgear is available in non-arc-resistant or arc-resistant constructions.

Article 100 Definitions: Switchgear *(cont.)*

- The definition of "Metal-Enclosed Power Switchgear" was revised to "Switchgear."
- This newly titled term will address all types of switchgear.
- New Informational Note includes a list of switchgear types to which the revised definition will apply.
- The term "Switchgear" includes:
  - Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
  - Metal-Clad Switchgear
  - Metal-Enclosed Interrupter Switchgear

Code-Wide Changes

- 120 proposals submitted to raise the 600 volt threshold to 1000 volts
- Resulted in numerous changes throughout the *NEC*
- Proposals were submitted by the High Voltage Task Group (HVTG)

Numerous changes throughout the *NEC* from the 600 volts threshold to 1000 volts

Code-Wide Changes: (4) New Articles

Article 393 Low Voltage Suspended Ceiling Power Distribution Systems

Article 646 Modular Data Centers

Article 728 Fire-Resistive Cable Systems

Article 750 Energy Management Systems

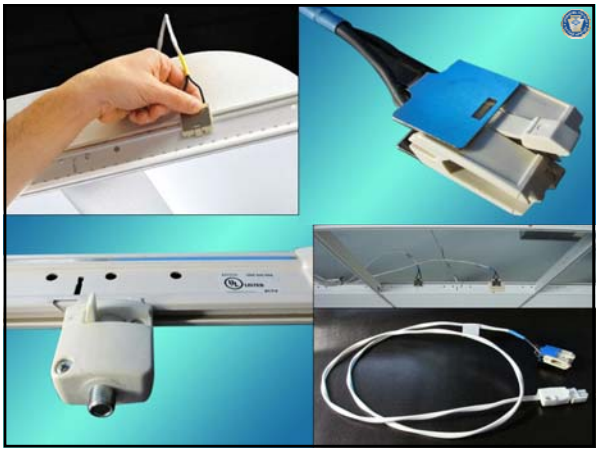
Article 393 Low Voltage Suspended Ceiling Power Distribution Systems

- A new article was added to address low-voltage Class 2 ac and dc volt supplied equipment *(lighting and power)* connected to ceiling grids, floors and walls built for this purpose.
- New article addresses equipment with similar features to track lighting but includes the wiring and power supply requirements.
- New article provides specific requirements for safe installations of low-voltage, power-limited power distribution, for power to lighting and non-lighting loads.
- The growing interest in alternative energy sources (e.g. PV, wind turbines, batteries, fuel cells, etc.) and the increase of low voltage, low power devices (sensors, LV lighting, IT equipment, AV equipment, etc.), has created a significant need for this new article.

Article 393 Low Voltage Suspended Ceiling Power Distribution Systems

A new article added to address low-voltage Class 2 ac and dc volt supplied equipment *(lighting and power)* connected to ceiling grids, floors and walls built for this purpose

A system that serves as a support for a finished ceiling surface and consists of a busbar and busbar support system to distribute power to utilization equipment supplied by a Class 2 power supply




Article 646 Modular Data Center

Article 646 Modular Data Centers

- A new Article 646 titled, "Modular Data Centers" was added to the 2014 *NEC*.
- New article draws a distinction between data centers that currently fall under the scope of Article 645 *(Information Technology Equipment)* and those described in this new article.
- Modular Data Centers (MDCs) are an important emerging trend in data center architecture.
- Their construction, installation and use results in a unique hybrid piece of equipment that falls somewhere in between a large enclosure and a pre-fabricated building.
- This new article identifies those areas of the *NEC* that should be applied to MDCs and also includes additional new requirements where necessary.

Article 646 Modular Data Centers

New Article was added to draw a distinction between data centers that currently fall under the scope of Article 645 *(Information Technology Equipment)* and those described in this new article

New article identifies those areas of the *NEC* that should be applied to MDCs and also includes additional new requirements where necessary

Article 728 Fire-Resistive Cable System

Article 728 Fire-Resistive Cable Systems

- A new article "Fire Resistive Cable Systems" has been added to address installations of fire resistive cables.
- This new article informs the installer that there are different details when installing fire rated cables.
- These systems must be installed in accordance with very specific materials, supports, and requirements and are critical for the survivability of life safety circuits.
- Installations of these cables is critical to their ability to function during a fire.

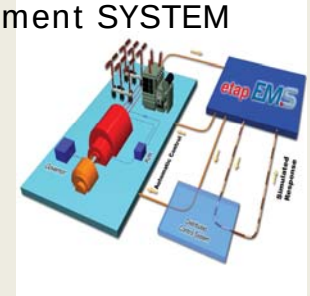
Article 728 Fire-Resistive Cable Systems

- There are diverse details for installing fire rated cables that differ from other type cables such as:
  - conduit, conduit supports, type of couplings, vertical supports and boxes and splices.
- In addition to the marking required in 310.120, fire resistive cable system cables and conductors are required to be surface marked with the suffix "-FRR" *(Fire Resistive Rating).*
- These fire resistive cables must also be marked with the circuit integrity duration in hours and with the system identifier.

Article 728 Fire-Resistive Cable Systems

A new article titled "Fire Resistive Cable Systems" had been added to the 2014 *NEC* to address installations of fire resistive cables

Article 750 Energy Management SYSTEM



Article 750 Energy Management Systems

- New article, "Energy Management Systems," added to address the types of loads permitted to be controlled through energy management systems.
- New article includes definitions, requirements for alternative-power sources, load-management provisions and field-marking requirements.
- Energy management has become common place in today's electrical infrastructure through the control of utilization equipment, energy storage and power production.
- New article will ensure an energy management systems does not override a system specific to addressing load shedding for an alternate power source for such things as fire pumps and emergency systems.

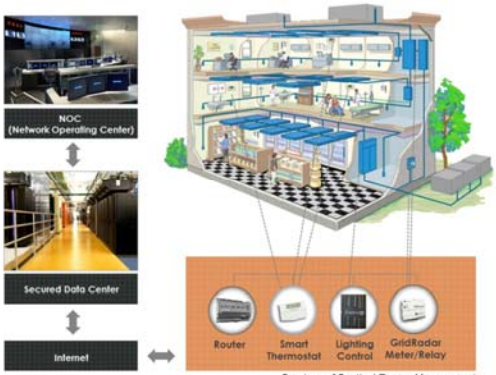
Article 750 Energy Management Systems

New article, "Energy Management Systems," added to address the types of loads permitted to be controlled through energy management systems

New article includes definitions, requirements for alternative-power sources, load-management provisions and field-marking requirements

An important aspect to consider in regards to an energy management system is to make sure an overall energy management system does not override a system specific to addressing load shedding for an alternate power source for such things as fire pumps and emergency systems

Article 750 Energy Management Systems



Courtesy of Sentinel Energy Management

Article 90 Introduction

90.1(A) Purpose (of the *Code*)

- The purpose of this *Code* is the practical safeguarding of persons and property from hazards arising from the use of electricity
- This *Code* is not intended as a design specification or an instruction manual for untrained persons
- Previous "Intention" of the *Code* deleted and incorporated into "Purpose" of the *Code*

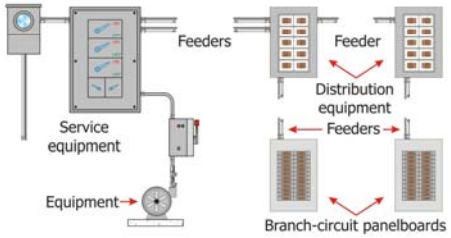
90.8(B) Number of Circuits in Enclosures

- The *Code* generally restricts the number of wires and circuits confined in a single enclosure.
- Limiting the number of circuits in a single enclosure minimizes the effects from a short circuit or ground fault ~~in one circuit~~.
- The words “in one circuit” in last sentence was deleted to clarify that a short circuit or ground fault condition is not limited to any one circuit within raceways or enclosures addressed by this section.

Chapter One General

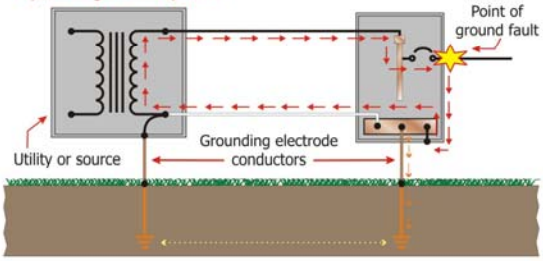
Article 100 Definitions: Selective Coordination

Coordination (Selective). Localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the selection and installation of overcurrent protective devices and their ratings or settings for the full range of available overcurrents, from overload to the maximum available fault current, and for the full range of overcurrent protective device opening times associated with those overcurrents.



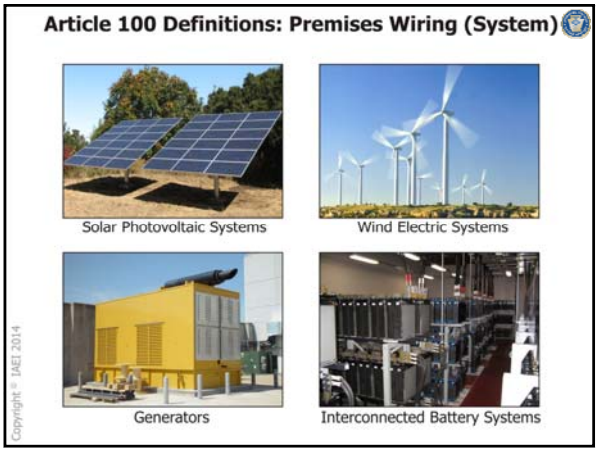
Article 100 Definitions: Effective Ground-Fault Current Path

Effective Ground-Fault Current Path. An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions from the point of a ground fault on a wiring system to the electrical supply source and that facilitates the operation of the overcurrent protective device or ground-fault detectors ~~on high-impedance grounded systems~~.



Article 100 Definitions: Intersystem Bonding Termination

- **Intersystem Bonding Termination.** A device that provides a means for connecting intersystem bonding conductors for communications systems to the grounding electrode system.
- Only intersystem bonding conductors are permitted to terminate on the "Intersystem Bonding Termination."
- Previous definition permitted "bonding conductors" to terminate on the intersystem bonding termination.
- The term "bonding conductors" was revised to "intersystem bonding conductors" to clarify the type of bonding conductors that are permitted to terminate on the intersystem bonding termination.



Article 100 Definitions: Raceway

- **Raceway.** An enclosed channel of metallic or nonmetallic materials designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this *Code*.
- **Informational Note:** A raceway is identified within specific article definitions.
- Definition of "Raceway" was revised by removing the "laundry list" of raceways listed in previous definition.
- "Laundry list" of wiring methods considered to be a raceway was incomplete.
- New Informational Note added indicating definition of a raceway can be identified within the specific wiring method article definition.

Article 100 Definitions: Raceway

- The following article definitions were changed or revised due to the revised definition of "Raceway" in Article 100:

352.2 Rigid Polyvinyl Chloride Conduit (PVC)

354.2 Nonmetallic Underground Conduit with Conductors (NUCC)

355.2 Reinforced Thermosetting Resin Conduit (RTRC)

356.2 Liquidtight Flexible Nonmetallic Conduit (LFNC)

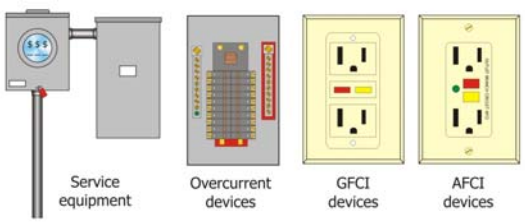
368.2 Busway

376.2 Metal Wireways

378.2 Nonmetallic Wireways

Article 100 Definitions: Readily Accessible

Accessible, Readily (Readily Accessible). Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to actions such as to use tools, to climb over or remove obstacles, or to resort to portable ladders, and so forth.



Article 100 Definitions: Retrofit Kit

- **Retrofit Kit.** A general term for a complete subassembly of parts and devices for field conversion of utilization equipment.
- New definition of the term “Retrofit Kit” was added to Article 100.
- New definition applies to LED listed retrofit kits used for luminaires and signs as referenced by new requirements in Articles 410 and 600.
- Extensive upgrades are underway in the sign and lighting industries to achieve greater energy efficiency in signs and luminaires by replacing in-place illumination systems with light emitting diodes (LED) technology.

Article 100 Definitions: Separately Derived System

Separately Derived System. An electrical source, other than a service, having no direct connection(s) to circuit conductors of any other electrical source other than those established by grounding and bonding connections.


Transformers


Generators

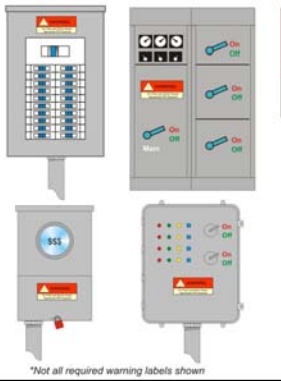
Article 100 Definitions: Substation

- **Substation.** An enclosed assemblage of equipment (e.g., switches, interrupting devices, circuit breakers, buses, and transformers) ~~under the control of qualified persons~~, through which electric energy is passed for the purpose of distribution, switching, or modifying its characteristics.
- The definition of "Substation" was relocated from 225.2 to Article 100 and revised for clarity.
- "Substation" applies to more than just outside branch circuits and feeders.
- This relocation was a companion proposal to transfer the text in previous 225.70 for substations to Article 490 covering equipment over 1000 volts.

110.9 Interrupting Rating

- Equipment intended to interrupt current at fault levels shall have an interrupting rating at nominal circuit voltage sufficient for the current that is available at the line terminals of the equipment.
- Equipment intended to interrupt current at other than fault levels shall have an interrupting rating at nominal circuit voltage sufficient for the current that must be interrupted.
- Equipment required to have interrupting rating equal to or greater than available short circuit current of the system
- Revision replaces "not less than" with "sufficient for" in two locations.
- This revision reverts back to the 2008 *NEC* Code language to improve the clarity and to enhance usability of this section.

110.16 Arc-Flash Hazard Warning



WARNING

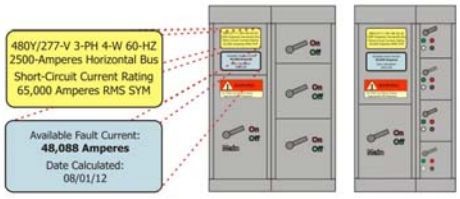
Arc Flash and Shock Hazard
Appropriate PPE Required

- Arc-flash warning label required to be applied in the field or factory
- Applies to equipment such as: switchboards, switchgear, panelboards, motor control centers, industrial control panels, meter socket enclosures, and enclosed circuit breakers
- Applies to equipment in other than dwelling occupancies

*Not all required warning labels shown

110.24(A) Available Fault Current

Non-dwelling unit service equipment required to be field-marked with the amount of available fault current when installed or modified



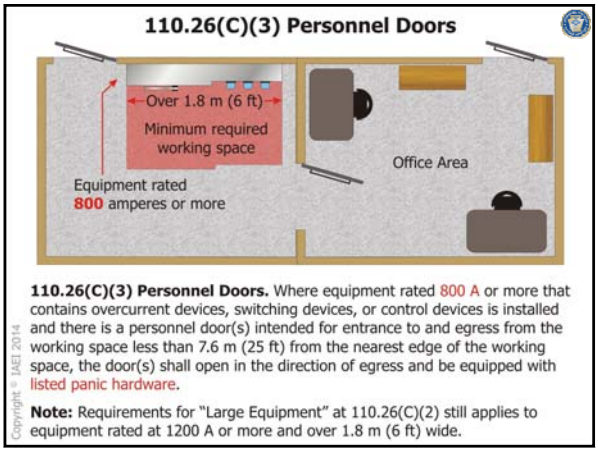
Service equipment in other than dwelling units shall be legibly marked in the field with the maximum available fault current

The field marking(s) shall include the date the fault current calculation was performed and be of sufficient durability to withstand the environment involved

Informational Note: The available fault current marking(s) are related to required short-circuit current ratings of equipment *(not NFPA 70E)*

110.26(C)(3) Personnel Doors

- The ampere value related to provisions for "Personnel Doors" for "Entrance to and Egress from Working Space" was lowered to 800 amperes from 1200 amperes.
- The term "listed panic hardware" replaces the previous list of specific hardware provided at this requirement.
- Serious injury and fatalities have occurred involving electrical equipment rated at below 1200 amperes.
- This same panic hardware change occurred at 110.33(A)(3) for equipment with a voltage rating over 600 volts.



110.26(E)(2) Dedicated Equipment Space

- "Dedicated Equipment Space" added for equipment located outdoors.
- Dedicated equipment space now required for outdoor installations as well as indoor installations.
- Dedicated equipment space equal to the width and depth of the equipment and extending from grade to a height of 1.8 m (6 ft) above the equipment.
- Same "equipment foreign to the electrical installation" is often present such as gas piping, water piping, mechanical refrigeration lines, irrigation equipment, phone and internet equipment, compressed air lines, and other non-electrical equipment.

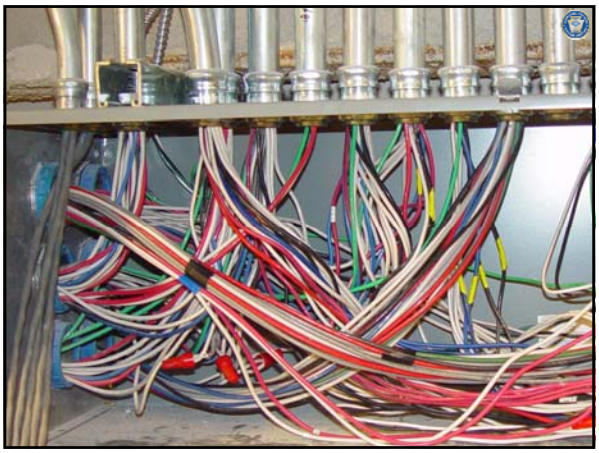
110.27(A) Live Parts Guarded Against Accidental Contact

- Revision for "Guarding of Live Parts" increases the elevation of live parts against accidental contact to 2.6 m (8½ ft) when voltages range from 301 to 600 volts.
- Live parts of electrical equipment with a voltage range from 50 to 300 volts can still comply with this requirement with a minimum of 2.5 m (8 ft) above the floor or other working surface.
- 2.6 m (8½ ft) clearance corresponds with the *National Electrical Safety Code* (NESC) clearances for live exposed parts.

Chapter Two Wiring and Protection

200.4(B) Neutral Conductors for Multiple Circuits

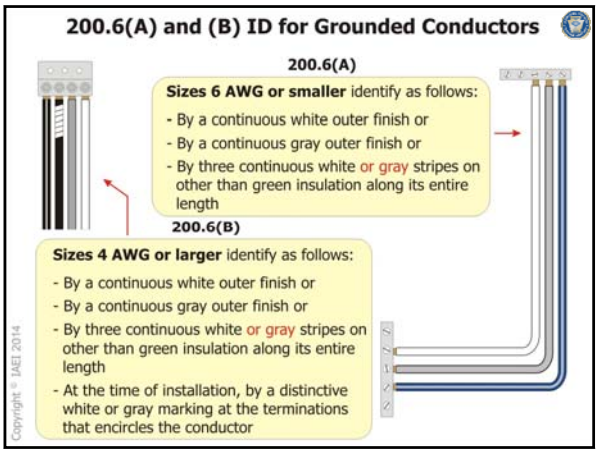
- New provisions added requiring grouping the common neutral conductor for multiple circuits with its associated ungrounded conductors when contained in the same enclosure.
- New exceptions were also added to relax this grouping requirement where the grouping is obvious or where looped conductors or conductors simply pass through the enclosure.
- Neutral conductors are typically terminated on a common neutral terminal bar making tracing these neutral conductors more difficult than tracing the ungrounded conductors.



200.6(A)(3) Means of Identifying Grounded Conductors

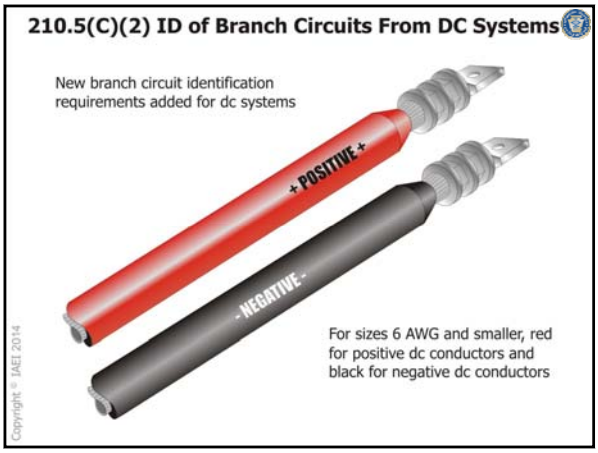
- Revision permits three continuous white "or gray" stripes along the grounded conductor's entire length *(on other than green insulation)* for identification of sizes 6 AWG or smaller.
- Gray coloring for grounded conductors is frequently requested for 277/480 volt circuits.
- White "or gray" stripes will offer more choices to installers.
- Same change occurred at the following locations:

200.6(B)(3)	200.7(A)(2)	200.7(C)(2)
200.6(E)	200.7(C)	
200.7	200.7(C)(1)	



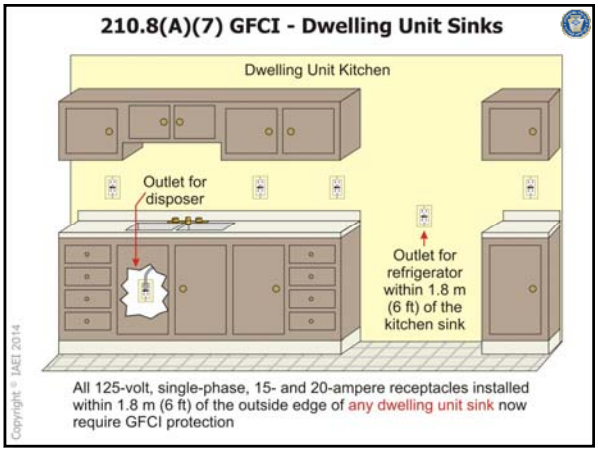
210.5(C)(2) Branch Circuits Supplied From Direct Current Systems

- New branch circuit identification requirements added for dc systems.
- For sizes 6 AWG and smaller, **red** for positive dc conductors and **black** for negative dc conductors.
- For branch circuits supplied from a dc system operating at more than 50 volts, each ungrounded conductor of 4 AWG or larger is to be identified by polarity at all termination, connection, and splice points by marking tape, tagging, or other approved means.
- Direct current (dc) applications are experiencing a re-emergence in the electrical industry because of such things as electric vehicle charging, solar photovoltaic (PV) systems, microgrids, wind generated electric systems, etc.



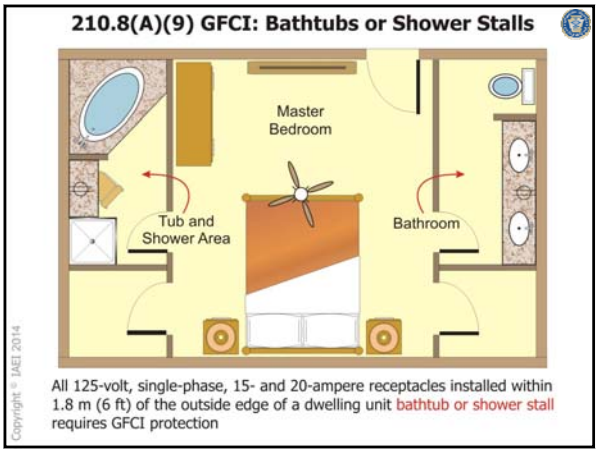
210.8(A)(7) GFCI: Dwelling Unit Sinks

- GFCI protection required for all 125-volt, single-phase, 15- and 20-ampere receptacles installed within 1.8 m (6 ft) of all dwelling unit sinks *(including kitchen sinks)*.
- Revision removes the term "located in areas other than kitchens."
- Rule will now include the garbage disposal receptacle located in the cabinet under a kitchen sink, receptacle located behind a refrigerator, or a general lighting branch circuit living room receptacle located on the back side of a kitchen sink bar area if they are located within 1.8 m (6 ft) of the kitchen sink.



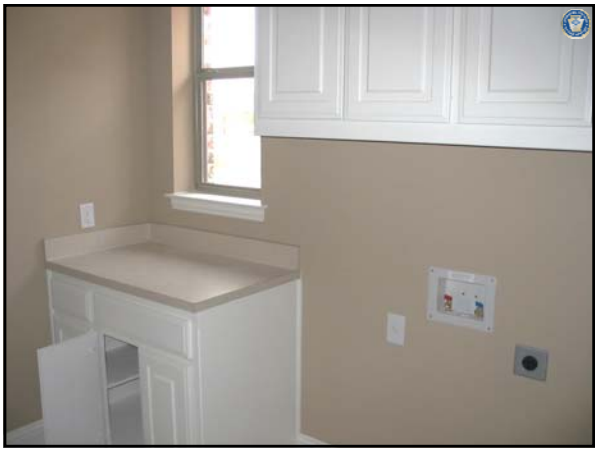
210.8(A)(9) Dwelling Unit Bathtubs or Shower Stalls

- GFCI protection now required where receptacles are installed within 1.8 m (6 ft) of the outside edge of dwelling unit "Bathtubs or Shower Stalls."
- Bathtubs or shower stalls are not always located in an area that meets the Article 100 definition of a "bathroom."
- Bathroom is "an area including a basin with one or more of the following: a toilet, a urinal, a tub, a shower, a bidet, or similar plumbing fixtures."
- Example: a room or area connected to a dwelling unit bedroom with a bathtub or shower stall as the only plumbing fixture in that particular room or area with a basin sink and toilet provided in another common area of the dwelling.



210.8(A)(10) GFCI: Laundry Areas

- All dwelling unit "Laundry Areas" now require GFCI protection for 125-volt, single phase, 15-and 20-ampere receptacles *(regardless of presence of a sink or distance from same).*
- A laundry room sink is no longer the driving factor whether GFCI protection is required or not.
- GFCI protection in laundry areas addresses increased shock hazard risk and is consistent with other *NEC* requirements for GFCI protection of receptacles in areas in close proximity of water.
- Increased usage of GFCI protection for personnel at receptacles of residential homes is a highly effective means of further reducing the potential for electrical shock hazards.



210.8(B)(8) GFCI: Garages, Service Bays, and Similar Areas

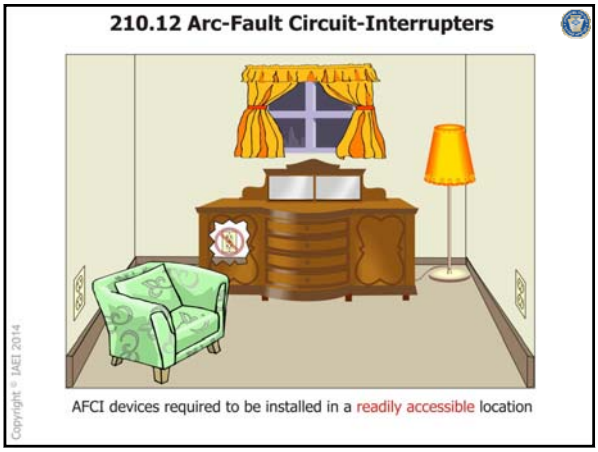
- GFCI protection required for all 125-volt, single-phase, 15- and 20-ampere receptacles installed in all non-dwelling unit garages, service bays, and similar areas *(other than vehicle exhibition halls and showrooms).*
- The phrase, "*where electrical diagnostic equipment, electrical hand tools, or portable lighting equipment are to be used*" was deleted.
- Many commercial garages have receptacles installed for purposes other-than the use of hand tools such as electric engine block heaters or battery charging equipment.
- Does not apply to such things as auto, power equipment (lawn mowers), or recreational vehicle dealership showrooms.

210.8(D) Dwelling Unit Kitchen Dishwasher Branch Circuit

- GFCI protection now required for all outlets that supply dishwashers installed in dwelling units.
  - Includes both receptacle and hard-wired outlet for dishwasher.
- Modern-day electronically controlled dishwashers can experience “end of life” failures that can result in increased risk of electrical shock.
- GFCI protection for outlets supplying dishwashers can mitigate these increased risk of electrical shock.

210.12 AFCI Protection

- New provision added to require all AFCI devices required by 210.12 to be installed in a readily accessible location.
- Aligns with the "readily accessible" requirements for GFCI devices covered at 210.8.
- Primarily related to occupant or user accessibility to the monthly testing and reset features of AFCI devices.
- Will aid and facilitate the ability to reset the AFCI device in the event the AFCI detects an arcing event.

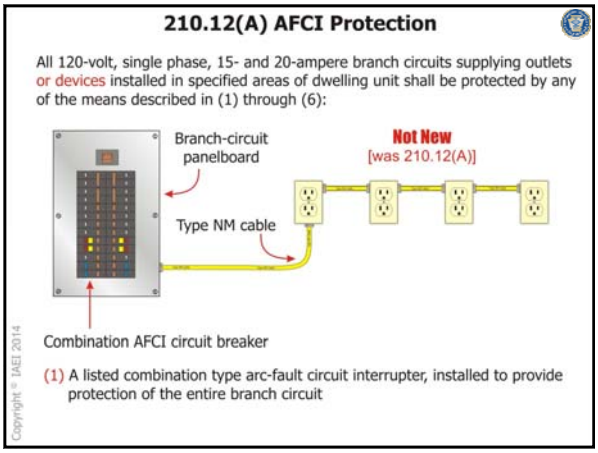


210.12(A) AFCI Protection

- "Kitchens" and "laundry areas" were added to list of areas requiring AFCI protection.
- This expansion into the kitchens and laundry areas is another step in the incremental approach for AFCI protection at dwelling units.
- AFCI protection was also expanded to include 15 or 20 ampere branch circuits supplying outlets or "devices" which would now include switches, etc.
- AFCI protection is now required to be installed in dwelling unit kitchens, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas, or similar rooms or areas.

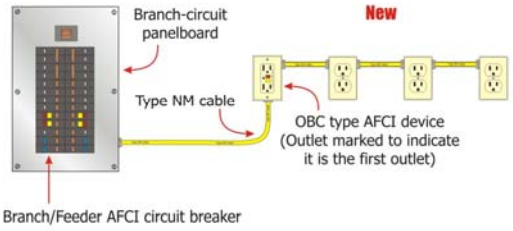
210.12(A)(1) – (6) AFCI Protection

- AFCI protection methods were expanded and language put into a list format.
- Provisions for outlet branch circuit (OBC) AFCI devices were expanded.
- The first two previous exceptions were revised to positive language and put into a list format of six provisions for providing AFCI protection.
- AFCI protection for dwelling units has taken another step forward with the continued incrementally approach to the expansion of this safety enhancing protection.



210.12(A) AFCI Protection

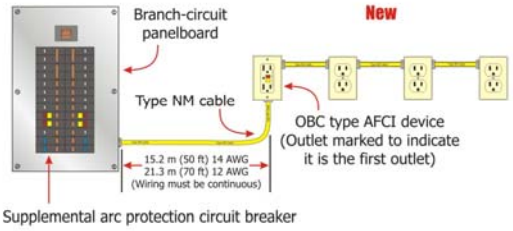
All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in specified areas of dwelling unit shall be protected by any of the means described in (1) through (6):



(2) A listed branch/feeder type AFCI installed at the origin of the branch circuit in combination with a listed outlet branch circuit type AFCI installed at the first outlet box on the branch circuit (first outlet marked to indicate that it is the first outlet)

210.12(A) AFCI Protection

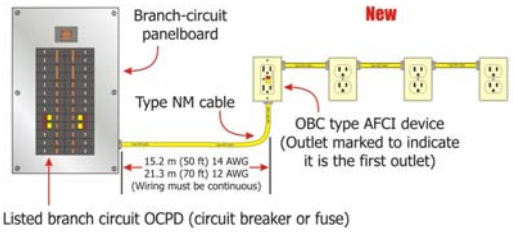
All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in specified areas of dwelling unit shall be protected by any of the means described in (1) through (6):



(3) A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch circuit type AFCI installed at the first outlet box on the branch circuit (with three limiting conditions)

210.12(A) AFCI Protection

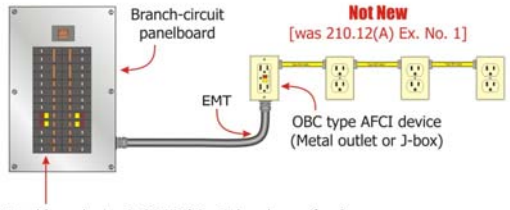
All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in specified areas of dwelling unit shall be protected by any of the means described in (1) through (6):



(4) System Combination Type AFCI. A listed outlet branch circuit type AFCI installed at the first outlet in combination with a listed branch circuit over-current protective device (with four limiting conditions) (OCPD & OBC AFCI device must be identified and listed as "System Combination" type AFCI)

210.12(A) AFCI Protection

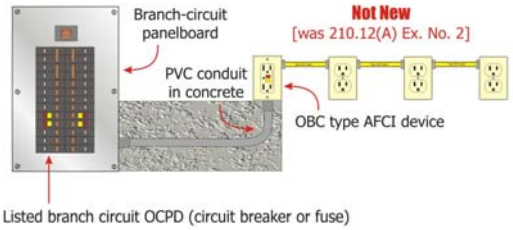
All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in specified areas of dwelling unit shall be protected by any of the means described in (1) through (6):



(5) A listed outlet branch-circuit type AFCI device (first outlet) is permitted with RMC, IMC, EMT, Type MC, steel armored Type AC cables, metal wireways, or metal auxiliary gutters and metal outlet and junction boxes installed for the portion of the branch circuit between the OCPD and the first outlet

210.12(A) AFCI Protection

All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in specified areas of dwelling unit shall be protected by any of the means described in (1) through (6):



(6) Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50mm (2 in.) of concrete for the portion of the branch circuit between the OCPD and the first outlet, it shall be permitted to install an a listed outlet branch circuit type AFCI at the first outlet

210.12 Arc-Fault Circuit-Interrupter Protection

Listed Outlet Branch-Circuit Type AFCI Devices

Listed Combination Overcurrent Protection Type AFCI Device

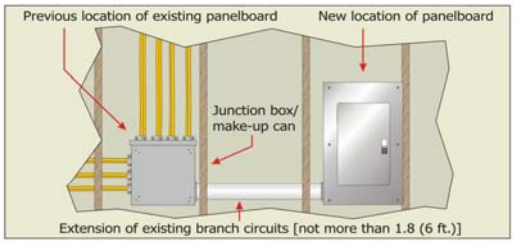
Courtesy of Pass & Seymour/Legrand

Courtesy of Eaton Corporation

210.12(B) Ex. Branch Circuit Extensions or Modifications - Dwelling Units

- Existing branch circuit conductors can be extended up to 1.8 m (6 ft.) without AFCI protection where no additional outlets or devices are installed for when modified or extended.
- Examples where situation does not require an AFCI device to be installed:
  - Extending branch circuit conductors within an enclosure for the purposes of replacing a device or utilization equipment.
  - Extending a branch circuit a short distance to a panelboard being replaced or upgraded.

210.12(B) AFCI - Extensions or Modifications



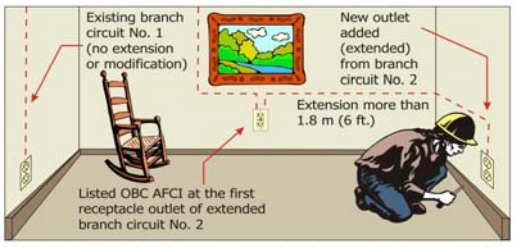
In any of the areas specified in 210.12(A), where branch-circuit wiring is modified, replaced or extended, the branch circuit shall be protected by:

(1) A listed combination AFCI located at the origin of the branch circuit, or

(2) A listed outlet branch-circuit AFCI located at the first receptacle outlet of the existing branch circuit

Exception: *AFCI protection is not required where the extension is not more than 1.8 m (6 ft.) and does not include any additional outlets or devices*

210.12(B) AFCI - Extensions or Modifications



In any of the areas specified in 210.12(A), where branch-circuit wiring is modified, replaced or extended, the branch circuit shall be protected by:

(1) A listed combination AFCI located at the origin of the branch circuit, or

(2) A listed outlet branch-circuit AFCI located at the first receptacle outlet of the existing branch circuit

Exception: *AFCI protection is not required where the extension is not more than 1.8 m (6 ft.) and does not include any additional outlets or devices*

210.12(C) AFCI: Dormitory Units

- All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dormitory unit bedrooms, living rooms, hallways, closets, and similar rooms are now required to be provided with AFCI protection.
- These confined living quarter conditions can lead to damage or misuse of the extension cords which in many cases are undersized for the applied load such as a microwave oven.
- Dorm occupants should be afforded the same level of AFCI protection provided to those who reside in a dwelling unit.

210.13 GFPE: Branch Circuits

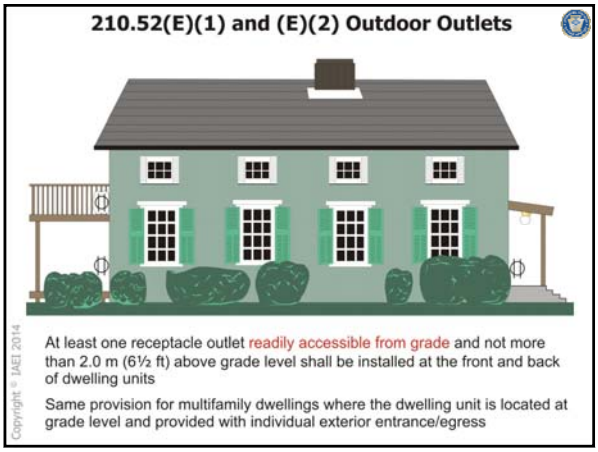
- GFP of equipment now required for branch circuit disconnects meeting provisions described at 230.95.
- New section requires each branch circuit disconnect rated 1000 amperes or more and installed on solidly grounded wye electrical systems of more than 150 volts to ground (but not exceeding 600 volts) to be provided with GFPE.
- New language for branch circuits was crafted after the existing language at 215.10 for feeders.
- Exceptions were also added for GFP provisions:
  - creating additional or increased hazards
  - already provided on the supply side of branch circuit

210.17 Electric Vehicle Branch Circuit

- Outlet(s) installed for the purpose of charging electric vehicles required to be supplied by a separate branch circuit with no other outlets.
- Charging an electric vehicle (EV) with an existing 120 volt receptacle outlet will typically overload an existing general purpose branch circuit.
- It should be noted that this new requirement does not demand that an outlet(s) for the specific and sole purpose of charging EV equipment be installed.
- A new I-Note was also added giving guidance to 625.2 for the definition of an “Electric Vehicle.”

210.52(E)(1) and (E)(2) Outdoor Outlets

- The requirements for outdoor receptacles at dwellings have been revised to permit the required receptacle outlets to be "readily accessible from grade."
- This provision was revised by removing the "while standing at grade level" requirement.
- This change will allow the deck or porch receptacle outlet to serve as one of the required outdoor receptacle outlets if it is "readily accessible from grade" with the deck or porch permitted to serve as "grade."
- Same revision to individual units of multifamily dwellings *(with individual exterior entrance/egress).*



210.52(E)(3) Balconies, Decks and Porches

- The requirement for a receptacle located at "Balconies, Decks, and Porches" has been revised to require the balcony, deck or porch to be attached to the dwelling.
- Requirements for the outdoor receptacle outlet to be installed "within the perimeter" of the balcony, deck or porch have been eliminated.
- "Detached" decks and such do not pose the same threat of extension cords being ran through windows and doorways as their "attached" counterparts.

210.52(E)(3) Balconies, Decks and Porches

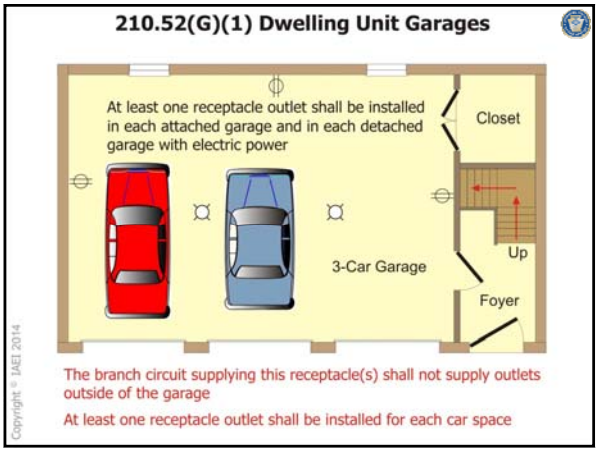
Balconies, decks and porches that are attached to the dwelling unit and are accessible from inside the dwelling unit shall have at least one receptacle outlet accessible from the balcony, deck or porch

The receptacle outlet shall not be located more than 2.0 m (6½ ft) above the balcony, deck, or porch walking surface

Outlet no longer required to be installed "within the perimeter of the balcony, deck or porch"

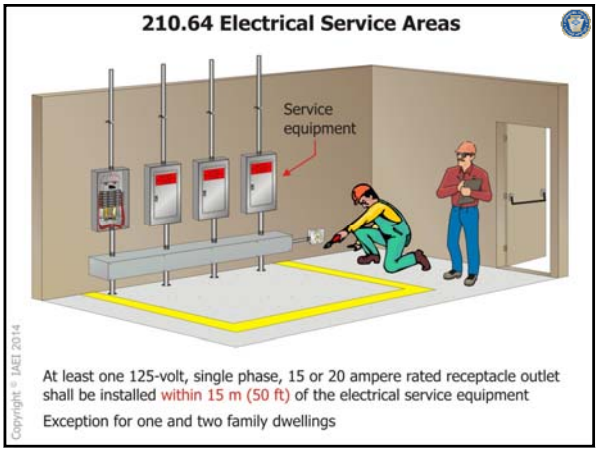
210.52(G) Basements, Garages, and Accessory Buildings

- "Basements, Garages, and Accessory Buildings" receptacle provisions revised into list format.
  - 210.52(G)(1) Garages
  - 210.52(G)(2) Accessory Buildings
  - 201.52(G)(3) Basements
- Branch circuit supplying garage receptacle(s) to supply only the garage.
- Receptacle required for each car space in a garage.
- This is an effort to recognize the possibility of electric vehicle (EV) and plug-in hybrid electric vehicle (PHEV) charging in these garages.



210.64 Electrical Service Areas

- New provision requiring 125 volt, single-phase, 15-or 20-ampere receptacle outlet to be installed at “Electrical Service Areas.”
- At least one 125 volt, single-phase, 15-or 20-ampere receptacle outlet is now required to be installed within 15 m (50 ft) of all electrical service areas.
- Test equipment such as portable electrical data acquisition equipment is often needed for monitoring and servicing electrical equipment in service areas.
- Exception was added for one- and two-family dwelling services.



This Concludes the Review of Selective 2014 NEC Code Sections