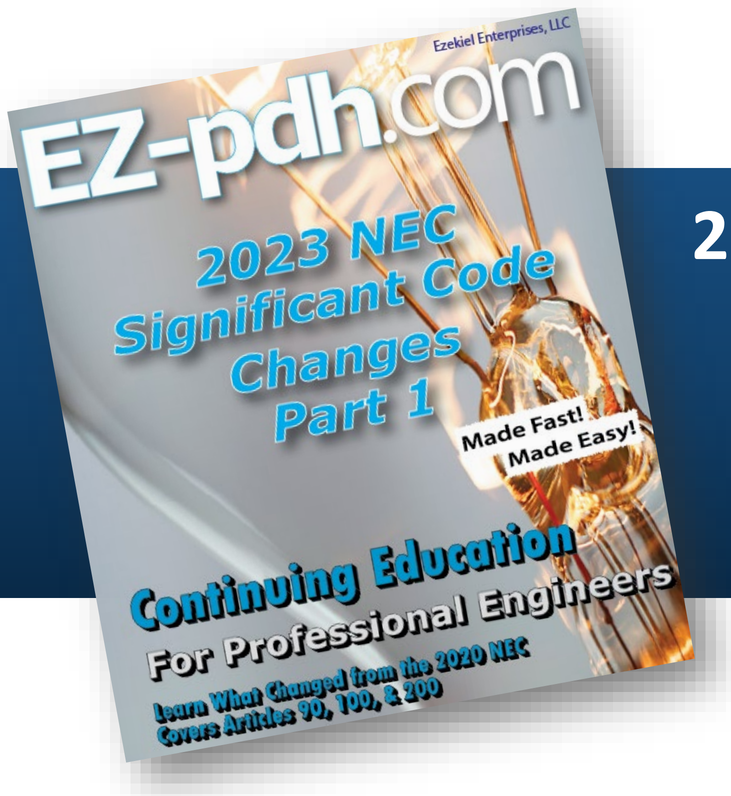

2023 NEC Significant Code Changes Part 1

Four (4) Continuing Education Hours
Course #EE2301

Approved Continuing Education for Licensed Professional Engineers

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Course Description:

The 2023 NEC Significant Code Changes Part 1 course satisfies four (4) hours of professional development.
The course is designed as a distance learning course that overviews the significant changes to the updated National Electrical Code (NEC).

Objectives:

The primary objective of this course is to enable the student to understand some of the significant changes including additions, deletions, and modification to Articles 100 and 200 of the 2023 Edition of NFPA 70: National Electrical Code (NEC) from the 2020 Edition.

Grading:

Students must achieve a minimum score of 70% on the online quiz to pass this course. The quiz may be taken as many times as necessary to successfully pass and complete the course.
A copy of the quiz questions are attached to the last pages of this document.

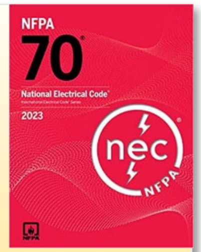
Table of Contents

2023 NEC Significant Code Changes Part 1

Introduction

Every three years, the National Electrical Code® (NEC®) is revised and expanded. Initially the NFPA® received **4,006** public suggestions for changes, which resulted in **1,805** first revisions. There were **1,956** public comments submitted in response to these **1,805** first revisions, resulting in **900** second revisions. Changes included editorial clarification, expanded requirements, new requirements, deleted requirements, and the relocation of other requirements

2023 NEC



5,962 Public Suggestions
2,705 Revisions Made
Changes Include

- Editorial Clarification
- Expanded Requirements
- New Requirements
- Deleted Requirements
- Relocation of Requirements

What to Expect

In this course the student will be presented an overview of the most significant changes found in the 2023 NEC. This is part 1 of a series of courses covering the changes and will progress through each chapter and its articles presenting the many important changes. The changes will be underlined for easy recognition and a short synopsis of the reason for the change is presented as well

Disclaimer

Although every effort has been made to the accuracy of the material presented, by no means shall the student use or substitute this material for official 2023 NEC. Additionally, Ezekiel Enterprises, LLC shall not be liable for any special, incidental, consequential, or exemplary damages resulting, in whole or in part, from the reader's uses of or reliance upon this material.

Chapter 1 General

Article 90

Articles 100–110

100 Definitions

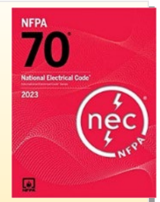
110 Requirements for Electrical Installations

Revision - 90.5(C)

Explanatory Material. (Mandatory Rules, Permissive Rules, Explanatory Material)

■ **What Changed:** Subdivision (C) revised to state that unless a standard referenced in the NEC contains a date, that reference is to be considered the latest edition of the standard.

■ **Its Effect:** This change will help reduce the number of public inputs and public comments submitted to modify a date for a standard referenced in the Code. The electrical professional will need to understand that a referenced standard containing no date is meant to be the latest standard available.



90.5(C) Explanatory Material. (Mandatory Rules, Permissive Rules, Explanatory Material)

(C) Explanatory Material.

Explanatory material, such as references to other standards, references to related sections of this *Code,* or information related to a *Code* rule, is included in this *Code* in the form of informational notes or an informative annex. Unless the standard reference includes a date, the reference is to be considered as the latest edition of the standard. Such notes are informational only and are not enforceable as requirements of this *Code*.

Brackets containing section references to another NFPA document are for informational purposes only and are provided as a guide to indicate the source of the extracted text. These bracketed references immediately follow the extracted text.

Relocation - Article 100

Part I, Definitions

■ **What Changed:** All definitions found within the NEC and the XXX.2 placeholders of various articles are now all located in Article 100.

■ **Its Effect:** This allows the electrical professional to locate all definitions in one location. The three parts have been eliminated and the definitions are found in alphabetical order.

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Revision - Article 100

Multiple definitions - Bonding Jumper, Equipment Bonding Jumper, Main Bonding Jumper, Supply-Side Bonding Jumper, System Bonding Jumper, Solidly Grounded, Equipment Grounding Conductor

■ **What Changed:** These Definitions have been revised to aid in electronic searches by removing their acronyms. Nothing was changed in their definitions.

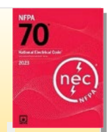
■ **Its Effect:** This will make it so much easier for the electrical professional to search for terms while using electronic PDF files or other online platforms and to comply with the NEC Style Manual

Revision - Article 100

Accessible (applied to wiring methods)

■ **What Changed:** Definition revised to clarify that wiring and electrical equipment made inaccessible by piping, ductwork, drains, raceways, or other mechanical systems is not considered as accessible as applied to wiring methods. part of the structure or finish of the building.

■ **Its Effect:** This revised wording for this definition helps to clarify the meaning for the electrical professional. This helps the AHJ and installer assure that equipment that requires access as it applies to wiring methods is installed correctly on the initial installation and not installed inaccessible by piping, ductwork, drains, raceways, or other mechanical systems



Accessible (as applied to wiring methods).
Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in or blocked by the structure, other electrical equipment, other building systems, or finish of the building.

New - Article 100

Class 4 Circuit

■ **What Changed:** New definition created for a Class 4 Circuit as it applies to Article 726. There are a total of six (6) definitions associated with this Class 4 technology. This emerging technology has been referred to in the past as Packet Energy Transfer (PET), Digital Electricity (DE), Pulsed Power, Smart Transfer Systems and Fault Managed Power (FMP). This technology involves a fault-managed system that verifies the powered device is present and operating correctly prior to a greater than Class 2 power is applied. A fault would cause a termination of the output power.

■ **Its Effect:** This new definition will provide clarity and guidance to electrical professionals as this new technology becomes available for installations as part of future electrical projects. Installing this technology correctly and safely is imperative for the assurance of safety to the end user.

Class 4 Circuit. The portion of the wiring system between the load side of a Class 4 transmitter and the Class 4 receiver, or Class 4 utilization equipment, as appropriate. Due to the active monitoring and control of the power transmitted, a Class 4 circuit is not considered a possible ignition source, and it minimizes the risk of electric shock.

Class 4 Device. Any active device connected to the Class 4 circuit. Some examples of Class 4 devices can include a Class 4 power transmitter, a Class 4 power receiver, or Class 4 utilization equipment.

Class 4 Power System. An actively monitored and controlled system that consists of one or more Class 4 power transmitters and one or more Class 4 power receivers connected by a cabling system.

Class 4 Receiver. A device that accepts Class 4 power and converts the Class 4 power to be used by utilization equipment.

Class 4 Transmitter. A device that sources Class 4 power, monitors the line for faults, ceases power transmission if a fault is sensed, and limits the energy and power into a fault to the levels described in 726.121(A).

Class 4 Tray Cable (CL4TC). A factory assembly of two or more insulated conductors rated at 450 volts DC, with or without associated bare or insulated equipment grounding conductors, under a nonmetallic jacket.

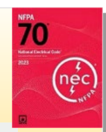
Class 4 Utilization Equipment. Devices that are directly powered by a Class 4 transmitter without the need for a separate Class 4 receiver.

New - Article 100

Counter (Countertop)

■ **What Changed:** A new definition was added to help users of the Code understand what constitutes a "Counter (Countertop)" location. The key distinction between these two types of surfaces is the quantity of spillage that the surfaces may be subjected to.

■ **Its Effect:** There appears to be installer and enforcement confusion as well as frequent product misapplications resulting from electrical equipment being installed incorrectly on these surfaces. In some cases, the equipment was not suitable or unlisted for either location. These new definitions and informational notes should help the installer and AHJ better understand these locations.



Counter (Countertop).
A fixed or stationary surface typically intended for food preparation and serving, personal lavation, or laundering or a similar surface that presents a routine risk of spillage of larger quantities of liquids upon outlets mounted directly on or in the surface.

New - Article 100

Energy Management System

■ **What Changed:** New definition was created for an energy management system. An energy management system will contain a monitor, a form of communication equipment, some type of controller and timer, and other devices responsible for monitoring or controlling an electrical load, form of power production, or a type of storage source.

■ **Its Effect:** Energy management systems are very prevalent in the built environment. Monitoring the use of electricity and supplementing utility power from the grid with other sources such as PV, wind, fuel cell, etc., is becoming the norm. This new definition offers guidance to electrical professionals as to what components commonly encompass these types of systems.

Energy Management System (EMS).
A system consisting of any of the following: a monitor(s), communications equipment, a controller(s), a timer(s), or other device(s) that monitors and/or controls an electrical load or a power production or storage source.

New - Article 100

Feeder Assembly

■ **What Changed:** New definition for Feeder Assembly was added to Article 100. This definition will provide consistency when referencing the factory cord or cable assembly between the electrical equipment and the mobile home, recreational vehicle, or park trailer panelboard.
the source.

■ **Its Effect:** This new definition makes the application of different NEC articles with similar installations (cord and plug connections to panelboards) more consistent. This provides better usability and applicability for users of the Code.

Feeder Assembly.
The overhead or under-chassis feeder conductors, including the equipment grounding conductor, together with the necessary fittings and equipment; or ~~at~~ the power-supply cord ~~listed~~ assembly for a mobile home ~~use~~, recreational vehicle, or park trailer, identified for the delivery of energy from the source of electrical supply to the panelboard within the mobile home, recreational vehicle, or park trailer

New - Article 100

Fibers/Flyings, Combustible. (Combustible Fibers/Flyings)

■ **What Changed:** New definition for Fibers/Flyings, Combustible. (Combustible Fibers/Flyings), which includes three informational notes that identify particle size and types of fibers/flyings.

■ **Its Effect:** The new definitions and informational notes will help all electrical professionals who design, install, and inspect within this type of environment to verify code compliance and determine the size and types of various combustible fibers/flyings.

Fibers/Flyings, Combustible. (Combustible Fibers/Flyings)
Fibers/flyings, where any dimension is greater than 500 μm in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature.

Informational Note No. 1: This definition and Informational Notes No. 2 and No. 3 have been extracted from NFPA 499-2021, Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas. The NFPA 499 reference is in brackets. Only editorial changes were made to the extracted text to make it consistent with this Code.

Informational Note No. 2: Section 500.5(D) defines a Class III location. Combustible fibers/flyings can be similar in physical form to ignitable fibers/flyings and protected using the same electrical equipment installation methods. Examples of fibers/flyings include flat platelet-shaped particulate, such as metal flake, and fibrous particulate, such as particle board core material. If the smallest dimension of a combustible material is greater than 500 μm, it is unlikely that the material would be combustible fibers/flyings, as determined by test. Finely divided solids with lengths that are large compared to their diameter or thickness usually do not pass through a 500 μm sieve, yet when tested could potentially be determined to be explosible.

Informational Note No. 3: See ASTM E1226, Standard Test Method for Explosibility of Dust Clouds, ISO 6184-1, Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air, or ISO/IEC/UL 80079-20-2, Explosive atmospheres — Part 20-2: Material characteristics — Combustible dusts test methods, for procedures for determining the explosibility of dusts. A material that is found to not present an explosible mixture could still be an ignitable fiber/flying, as defined in this article. Historically, the explosibility condition has been described as presenting a flash fire or explosion hazard. It could be understood that the potential hazard due to the formation of an explosible mixture when suspended in air at standard atmospheric pressure and temperature would include ignition.

Revision - Article 100

Ground-Fault

■ **What Changed:** The change was made from “metallic” to “metal” to comply with the NEC Style Manual.

■ **Its Effect:** It is not a big change, but it helps to add clarity and useability by updating the words of the definition from “metallic” to “metal.”

Ground Fault ~~Condition~~.
An unintentional, electrically conductive connection between an ungrounded conductor of an electrical circuit and the normally non-current-carrying conductors, ~~metallic~~metal enclosures, ~~metallic~~metal raceways, ~~metallic~~metal e quipment, or earth.

New - Article 100

Impedance Grounding Conductor

■ **What Changed:** A new definition for Grounded Conductor, Impedance was added to Article 100 There was no definition for a conductor that made a connection between the neutral point for an impedance grounded system and the grounding impedance device.

■ **Its Effect:** Electrical professionals will now have a definition that is accurate and consistent with this conductor and how it operates in an electrical system.

Grounded System, Impedance (Impedance Grounded System).
An electrical system that is grounded by intentionally connecting the system neutral point to ground through an impedance device.

New - Article 100

Impedance Grounded System

■ **What Changed:** A new definition for Grounded System, Impedance was added to Article 100. There was no definition for an impedance grounded system before the 2023 NEC code cycle. Previously this had resulted in an inconsistent use and understanding of these systems as it applied with high impedance grounded neutral systems and impedance grounded neutral systems.

■ **Its Effect:** Electrical professionals will now have a definition that is accurate and consistently defines elements that make up this system.

Grounded System, Impedance (Impedance Grounded System).
An electrical system that is grounded by intentionally connecting the system neutral point to ground through an impedance device.

Revision - Article 100

In Sight From (Within Sight From), (Within Sight)

■ **What Changed:** The definition of "In Sight From (Within Sight From), (Within
Sight)" was revised per requirements of the NEC Style Manual, stating that definitions shall not contain requirements or recommendations.

■ **Its Effect:** The revised definition will assure that the electrical professional understands that equipment that is visible and not more than 15 m (50 ft.) distant from other equipment is considered to be in sight from that other equipment.

In Sight From (Within Sight From,) (Within Sight).
~~Where this *Code* specifies that one equipment shall be "in sight from," "within sight from," or "within sight of," and so forth, another equipment, the specified equipment is to be~~ Equipment that is visible and not more than 15 m (50 ft) distant from ~~the~~ other equipment is *in sight from* that other equipment.

New - Article 100

Likely to Become Energized

■ **What Changed:** A new definition for Likely to Become Energized was added to Article 100. There was previously no definition of this phrase that appears multiple times and locations within the NEC.

■ **Its Effect:** Electrical professionals will now have a definition that is accurate and defines the meaning of this phrase. This should eliminate any confusion or misunderstandings when this phase is used.

Likely to Become Energized.
Conductive material that could become energized because of electrical insulation or electrical spacing failure.

New - Article 100

Load Management

■ **What Changed:** New definition for Load Management was added to article 100.

■ **Its Effect:** This new definition will provide clarity and guidance to electrical professionals involved with load management involving energy management systems.

Load Management.
The process within an energy management system that limits the total electrical load on an electrical supply system to a set value by adjusting or controlling the individual loads.

New - Article 100

Normal High-Water Level

■ **What Changed:** New definition for Normal High-Water Level added to Article 100 in order to help AHJs determine the elevation for the electrical datum plane distances used in Articles 551, 555, and 682.

■ **Its Effect:** This definition will provide an easier and more consistent way to determine the elevation for the electrical datum planes.

Normal High-Water Level (as applies to electrical datum plane distances).

Natural or Artificially Made Shorelines: An elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial.

Rivers and Streams: The elevation of the top of the bank of the channel. Streams, rivers, and tributaries that are prone to flooding and effects of water runoff shall consider the "bankfull stage" where an established gauge height at a given location along a river or stream, above which a rise in water surface will cause the river or stream to overflow the lowest natural stream bank somewhere in the corresponding reach.

Flood Control Bodies of Water: The flood pool maximum water surface elevation of a reservoir, equal to the elevation of the spillway.

Non flood Control Bodies of Water: The flowage easement boundary in which the highest water surface elevation defined by the area existing between governmental-owned property line(s) and a contour line with perpetual rights to flood the area in connection with the operation of the reservoir.

New - Article 100

PV DC Circuit, PV Source Circuit, PV String Circuit

■ **What Changed:** New terms and revised definitions for PV System DC elements.
PV DC Circuit (PV System DC Circuit) includes the subsets of PV Source Circuit and PV String Circuit were added to article 100. The new PV System DC Circuit term is inclusive of the series and/or parallel dc circuit conductors between the modules and combiners, inverters, or PV system dc disconnect. A PV Source Circuit is a subset of a PV System DC Circuit. A PV System String Circuit is a subset of a PV System DC Circuit.

■ **Its Effect:** The new terms and definitions for PV system dc circuit conductors and elements align with common usage resulting in additional clarity for NEC users.

PV DC Circuit, Source ~~Circuit~~. (PV Source Circuit)
The PV dc circuit conductors between modules in a PV string circuit, and from ~~modules~~ string circuits to dc combiners, electronic power converters, or a dc PV system disconnecting means.

PV DC Circuit, String. (PV String Circuit)
The PV source circuit conductors of one or more series-connected PV modules.

PV DC Circuit (PV System DC Circuit).
Any dc conductor in PV source circuits, PV ~~output~~ string circuits, ~~dc-to-dc converter source circuits,~~ and PV dc-to-dc converter ~~output~~ circuits.

New - Article 100

Restricted Industrial Establishment [as applied to hazardous (classified) locations].

■ **What Changed:** Restricted Industrial Establishment is a new definition in Article 100 created to align with requirements for installations specifically found within hazardous (classified) locations.

■ **Its Effect:** This change will require the entire electrical industry to study for understanding the new definition of "Restricted Industrial Establishment." This action did not change the intent of the Code. This documentation shall be submitted to the authority having jurisdiction (AHJ) for review and approval with the plan submitted by the designer of record. The new definition still includes language for "Qualified Persons" and will require the AHJ to verify personnel that install, maintain, operate, and inspects these facilities are qualified for these industrial establishments.

Restricted Industrial Establishment [as applied to hazardous (classified) locations].
Establishment with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation.

New - Article 100

Servicing

■ **What Changed:** Servicing is a new definition in Article 100 created for servicing of electrical equipment to assist in maintenance and repair activities. This new
definition distinguishes the act of servicing and maintenance of electrical equipment from reconditioning of electrical equipment. It will help ensure the operational performance of the electrical equipment during the life of the equipment.

■ **Its Effect:** This addition will assist electrical professionals in maintaining and preserving large pieces of equipment, switchgear, switchboards, etc., typically installed in high-rise buildings, hospitals, schools, office buildings, and critical installations.

Servicing.
The process of following a manufacturer's set of instructions or applicable industry standards to analyze, adjust, or perform prescribed actions upon equipment with the intention to preserve or restore the operational performance of the equipment.

New - Article 100

Short Circuit

■ **What Changed:** New definition for short circuit was added to article 100 to improve usability of the Code.

■ **Its Effect:** The inclusion of this definition within the NEC will help the electrical professional locate and understand the meaning of the term short circuit and its correct application. This will reduce misapplication of the term resulting in more accurate usage when discussing electrical issues.

Short Circuit.
An abnormal connection (including an arc) of relatively low impedance, whether made accidentally or intentionally, between two or more points of different potential.

New - Article 100

Transformer

■ **What Changed:** New definition for the term transformer was added to article 100. This new definition covers both single and polyphase equipment operating by electromagnetic induction. The definition was careful not to state “changing voltage or current” because isolating transformers filter noise without changing nominal voltages.

■ **Its Effect:** A definition will add understanding for the electrical professionals who utilizes this Code to install these items.

Transformer.
~~An individual transformer,~~ Equipment, either single-phase or polyphase, ~~identified by a single nameplate, unless otherwise indicated in this article~~ that uses electromagnetic induction to convert current and voltage in a primary circuit into current and voltage in a secondary circuit.

New - Article 100

Work Surface

■ **What Changed:** A new definition was added to help understand what constitutes a "Work Surface" location. The work surface definition has been included to help Code users understand the distinction between a countertop and a work surface when these two terms are used interchangeably. The key distinction between these two types of surfaces is the quantity of spillage that the location may be subjected to.

■ **Its Effect:** There appears to be installer and enforcement confusion as well as frequent product misapplications resulting from electrical equipment being installed incorrectly on these surfaces. In some cases, the equipment was not suitable or unlisted for either location. These new definitions and informational notes should help the installer and AHJ better understand these locations.

Work Surface.
A fixed, stationary, or portable surface typically intended for dry use and for tasks other than food preparation, personal lavation, or laundering that presents an incidental risk of spillage of smaller quantities of beverages and other liquids upon outlets mounted directly on or recessed in the surface. (CMP-2)
Informational Note No. 1: See UL 111, *Outline of Investigation for Multioutlet Assemblies*, and UL 962A, *Furniture Power Distribution Units*, which establish the performance evaluation criteria and construction criteria.
Informational Note No. 2: See 406.5(F), 406.5(G)(1), and 406.5(H) for information on receptacles for work surfaces distinguished from receptacles for counters and countertops.

New - 110.3(A)

Examination, Identification, Installation, Use, and Listing (Product Certification) of Equipment. (A) Examination

■ **What Changed:** New list item number 8 was added that addresses cybersecurity for network- connected life safety equipment. It needs to be considered when evaluating equipment for safety. This does not mandate the electrical professional conduct a cybersecurity evaluation but to remember and recognize that it is a hazard.

■ **Its Effect:** The electrical professional now has information related to cybersecurity concerns and a requirement to make considerations when evaluating network-connected life safety equipment.

110.3 Examination, Identification, Installation, Use, and Listing (Product Certification) of Equipment.

(A) Examination

(8) Cybersecurity for network-connected life safety equipment to address its ability to withstand unauthorized updates and malicious attacks while continuing to perform its intended safety functionality

Informational Note No. 3: See the IEC 62443 series of standards for industrial automation and control systems, the UL 2900 series of standards for software cybersecurity for network-connectable products, and UL 5500, *Standard for Remote Software Updates*, which are standards that provide frameworks to mitigate current and future security cybersecurity vulnerabilities and address software integrity in systems of electrical equipment.

New - 110.3(B)

Examination, Identification, Installation, Use, and Listing (Product Certification) of Equipment. (B) Installation and Use.

- **What Changed:** New informational note added allowing the use of a QR code to access installation instructions.

- **Its Effect:** The electrical professional now has a new technology tool at his/her fingertips to locate important information concerning electrical devices and equipment. QR codes are appearing on many different items, and this informational note recognizes that they are appearing on electrical items as well.

110.3 Examination, Identification, Installation, Use, and Listing (Product Certification) of Equipment.

(B) Installation and Use.

Equipment that is listed, labeled, or both, or identified for a use shall be installed and used in accordance with any instructions included in the listing or, labeling, or identification.

Informational Note: The installation and use instructions may be provided in the form of printed material, quick response (QR) code, or the address on the internet where users can download the required instructions.

Revision - 110.14(A)

Terminals

■ **What Changed:** "Electrical" for connection (as opposed to mechanical) was added for additional clarity about the connection. This change will clarify what kind of connection is being discussed as it applies to terminations found with various types of electrical equipment.

■ **Its Effect:** This change will reduce any confusion that may have existed in the electrical industry regarding an electrical or mechanical type of connection for these terminations points.

(A) Terminals.
Connection of conductors to terminal parts shall ensure a thoroughly good mechanically electrical secure connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Terminal connections shall not be made to the drive surfaces of either wire-binding screws or set-screw-type pressure connectors. Terminal connections shall not rely solely upon friction, magnetic, or cantilevered-spring contact with wire-binding screws or set-screw-type pressure connectors. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for 10 AWG or smaller conductors.
Terminals for more than one conductor and terminals used to connect aluminum shall be so identified.

Revision - 110.16(B)

Service Equipment and Feeder Supplied Equipment

■ **What Changed:** Labeling requirements have been changed for Service Equipment from 1200 amperes to 1000 amperes or more in Section 110.16(B). It was necessary to add the phrase “arc flash” to clarify the type of permanent label required for this equipment. The revision from 1200 to 1000 amperes was
in an effort to advance and protect worker safety.

■ **Its Effect:** This change will help the electrical professional to better maintain and operate large service equipment safely as per applicable industry standards.

(B) Service Equipment and Feeder Supplied Equipment.
In other than dwelling units, in addition to the requirements in 110.16(A), a permanent arc flash label shall be field or factory applied to service equipment and feeder supplied equipment rated 1200 amps1000 amperes or more. The arc flash label shall be in accordance with applicable industry practice and include the date the label was applied. The label shall meet the requirements of 110.21(B) and contain the following information:.

1. Nominal system voltage
2. Available fault current at the service overcurrent protective devices
3. The clearing time of service overcurrent protective devices based on the available fault current at the service equipment
4. The date the label was applied

Exception: Service equipment labeling shall not be required if an arc flash label is applied in accordance with acceptable industry practice.
Informational Note No. 1: *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.
Informational Note No. 1: See ANSI Z535.4-2011 (R2017), *Product Safety Signs and Labels*, provides for guidelines for the design of safety signs and labels for application to products.
Informational Note No. 2: See *NFPA 70E*-2021, *Standard for Electrical Safety in the Workplace,* Acceptable for applicable industry practices for equipment labeling are described in *NFPA 70E*-2018, *Standard for Electrical Safety in the Workplace*. This standard provides specific criteria for developing arc-flash labels for equipment that provides nominal system voltage, incident energy levels, arc-flash boundaries, minimum required levels of personal protective equipment, and so forth.

Revision - 110.17

Servicing and Maintenance of Equipment

■ **What Changed:** Language added in Section 110.17 restricting service and maintenance of equipment to qualified persons trained to perform the work.

■ **Its Effect:** This will help electrical professionals when servicing or replacing parts for electrical equipment. This will help ensure the electrical equipment works properly and in a safe manner.

110.17 Servicing and Maintenance of Equipment.
Servicing and electrical preventive maintenance shall be performed by qualified persons trained in servicing and maintenance of equipment and shall comply with the following:

1. The servicing and electrical preventive maintenance shall be performed in accordance with the original equipment manufacturer's instructions and information included in the listing information, applicable industry standards, or as approved by the authority having jurisdiction.
2. The servicing and electrical preventive maintenance shall be performed using identified replacement parts that are verified under applicable product standards. The replacement parts shall comply with at least one of the following:
    1. Be provided by the original equipment manufacturer
    2. Be designed by an engineer experienced in the design of replacement parts for the type of equipment being serviced or maintained
    3. Be approved by the authority having jurisdiction

Informational Note No. 1: For equipment that is not listed or field labeled, or for which components are no longer available from the original equipment manufacturer, one way to determine suitability is to review the documentation that accompanies the replacement parts.
Informational Note No. 2: See NFPA 70B, *Recommended Practice for Electrical Equipment Maintenance*, for information related to preventive maintenance for electrical, electronic, and communication systems and equipment.

New - 110.20

Reconditioned Equipment

■ **What Changed:** General requirements were established in Section 110.20 that will apply to all equipment that is reconditioned.
New text in this new section addresses if reconditioned equipment is permitted by the NEC. The language requires the use of identified replacement parts verified under applicable standards, provided by the original equipment manufacturer (OEM), or designed by an engineer with applicable experience.

■ **Its Effect:** This new section provides the electrical professional with guidelines for inspecting, evaluating, and approving reconditioned equipment. It should alleviate frustration in the field between installers, manufacturers, and AHJs when this equipment is being installed or being considered for repair or replacement.

110.20 Reconditioned Equipment.

Reconditioned equipment shall be permitted except where prohibited elsewhere in this *Code*. Equipment that is restored to operating condition shall be reconditioned with identified replacement parts, verified under applicable standards, that are either provided by the original equipment manufacturer or that are designed by an engineer experienced in the design of replacement parts for the type of equipment being reconditioned.

(A) Equipment Required to Be Listed.

Equipment that is reconditioned and required by this *Code* to be listed shall be listed or field labeled as reconditioned using available instructions from the original equipment manufacturer.

(B) Equipment Not Required to Be Listed.

Equipment that is reconditioned and not required by this *Code* to be listed shall comply with one of the following:

(1) Be listed or field labeled as reconditioned
(2) Have the reconditioning performed in accordance with the original equipment manufacturer instructions

(C) Approved Equipment.

If the options specified in 110.20(A) or (B) are not available, the authority having jurisdiction shall be permitted to approve reconditioned equipment, and the reconditioner shall provide the authority having jurisdiction with documentation of the changes to the product.

Revision - 110.21(A)(1)

General

■ **What Changed:** Changes made in Section 110.21(A)(1) to requirements for equipment marking to clarify how to apply or affix labels on all electrical equipment.

■ **Its Effect:** The requirement for a permanent label is important for the inspectors and installers to understand for better compliance in the field. Steps must be evaluated as to the longevity of these labels in the various environments that equipment is placed into service.

(1) General.
The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified shall be placed on applied or affixed onto all electrical equipment. Other markings that indicate voltage, current, wattage, or other ratings shall be provided as specified elsewhere in this *Code*. The marking or label shall be of sufficient durability to withstand the environment involved.

Revision -110.21(A)(2)

Reconditioned Equipment

■ **What Changed:** Information in Section 110.21(A)(2) was reorganized into a list format and clarifies that the original listing mark is to be removed or made permanently illegible.

■ **Its Effect:** This change clarifies for the electrical professional what mark needs to be removed and that it is important for the equipment nameplate to remain with the equipment. It will ensure the equipment can be maintained and serviced
properly in the future.

(2) Reconditioned Equipment.

Reconditioned equipment shall be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning. following:

1. Name, trademark, or other descriptive marking of the organization that performed the reconditioning
2. The date of the reconditioning
3. The term *reconditioned* or other approved wording or symbol indicating that the equipment has been reconditioned

Reconditioned equipment shall be identified as "reconditioned" and the original listing mark removed. The original listing mark shall be removed or made permanently illegible. The equipment nameplate shall not be required to be removed or made permanently illegible, only the part of the nameplate that includes the listing mark, if applicable. Approval of the reconditioned equipment shall not be based solely on the equipment's original listing.

Exception: In industrial occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.

Informational Note No. 1: Industry ANSI-approved standards are available for application of reconditioned and refurbished equipment.

Informational Note No. 2: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured* even though these are sometimes different processes.

Informational Note No. 3: The original listing mark may include the mark of the certifying body and not the entire equipment label.

Revision - 110.21(B)(1)

Field-Applied Hazard Marking

■ **What Changed:** Language added in Section 110.21(B)(1) towards durability for hazard marking labels and signs for electrical equipment installed in various environments. A field-applied hazard marking is an important sign or label. It is important that this marking is durable to remain with the electrical equipment in wet, damp, dry, or even corrosive environments.

■ **Its Effect:** The installer and the inspector will need to conduct an assessment to make sure that the marking will stay adhered to the electrical equipment. These requirements will ensure the safety of the electrical professional as well as keep important hazard labels and signs where they need to be installed.

(B) Field-Applied Hazard Markings.
Where caution, warning, or danger hazard markings such as labels or signs or labels are required by this *Code*, the labels markings shall meet the following requirements:

1. The marking shall be of sufficient durability to withstand the environment involved and warn of the hazards using effective words, colors, symbols, or any combination thereof.

Informational Note No. 1: See ANSI Z535.2-2011 (R2017), *Environmental and Facility Safety Signs*, which describes the design, application, and use of safety signs in facilities and in the environment.
Informational Note No. 2: See ANSI Z535.4-2011 (R2017), *Product Safety Signs and Labels*, provides guidelines for suitable font sizes, words, colors, symbols, and location requirements for labels which details the design, application, use, and placement of safety signs and labels on a wide variety of products.

Revision - 110.22

(A) General

■ **What Changed:** Text was added to clarify when the identification of a disconnecting means is required or not required.
CMP-1

■ **Its Effect:** This change will assist the installer and authority having jurisdiction (AHJ) in clarifying that identification of disconnecting means is not required when the location of the circuit source is evident. An example could be the disconnecting means for a water heater or furnace installed close to an electrical panel enclosing the disconnecting means.

(A) General.
Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. In other than one- or two-family dwellings, the marking shall include the identification and location of the circuit source that supplies the disconnecting means unless located and arranged so the identification and location of the circuit source is evident. The marking shall be of sufficient durability to withstand the environment involved.

Relocation - 110.26

Spaces About Electrical Equipment

■ **What Changed:** Text was relocated from (A) (2)(b) in Section 110.26, as it concerns more than just working space width. Access to egress from working space requirements have been clarified in Section 110.26 for equipment 1000 volts, nominal, or less.

■ **Its Effect:** This change recognizes a serious safety concern to the electrical professional and adds specific language to help reduce serious injury or death from occurring. These requirements need to be installed correctly at the initial installation, and the AHJ will play a vital part in making sure these requirements are adhered to in the field.

110.26 Spaces About Electrical Equipment.
Access and Working space, and access to and egress from working space, shall be provided, and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment. Open equipment doors shall not impede access to and egress from the working space. Access or egress is impeded if one or more simultaneously opened equipment doors restrict working space access to be less than 610 mm (24 in.) wide and 2.0 m (6 **1⁄2** ft) high.

New - 110.26(A)(6)

Grade, Floor, or Working Platform

■ **What Changed:** New list item (6) was added at 110.26(A) to address the working space conditions of the floor at electrical equipment locations, emphasizing a need to be clear of objects and level and flat as practical.

■ **Its Effect:** This change will assist the installer and inspection authorities to apply the code requirements uniformly and avoid any issues at the time of inspection. When the electrical professional works on energized or non-energized electrical equipment, the floor condition should not add to safety concerns. This new requirement applies to the floor space that encompasses the required depth and width of the working space.

110.26(A)(6) Grade, Floor, or Working Platform.
The grade, floor, or platform in the required working shall be kept clear, and the floor, grade, or platform in the working space shall be as level and flat as practical for the entire required depth and width of the working space.

New - 110.29

In Sight From (Within Sight From, Within Sight)

■ **What Changed:** New Section 110.29 has been added to address electrical equipment and the term "In Sight From."

■ **Its Effect:** Section 110.29 will help the electrical professional apply this phrase correctly when used with electrical equipment requirements. This distance is to be visible and not more than 15 m (50 ft) from the other equipment, which is consistent with the previous edition of the Code. Refer to revised definition found in Article 100.

110.29 In Sight From (Within Sight From, Within Sight).
Where this *Code* specifies that one equipment shall be "in sight from," "within sight from," or "within sight of" another equipment, the specified equipment shall be visible and not more than 15 m (50 ft) distant from the other.

Revision - 110.33(A)

Entrance

■ **What Changed:** Requirements for access and egress from working space for equipment over 1000 volts, nominal, was revised and clarified in Section 110.33(A).

■ **Its Effect:** This change will assist the electrical professional to maintain and inspect the electrical equipment in a safe manner as mentioned in section 90.1 of NEC.

(A) Entrance.

At least one entrance to enclosures for electrical installations as described in 110.31 not less than 610 mm (24 in.) wide and 2.0 m (6**1⁄2** ft) high shall be provided to give access to the working space about electrical equipment. Open equipment doors shall not impede access to egress from the working space. Access or egress is impeded if one or more simultaneously opened equipment doors restrict working space access to be less than 610 mm (24 in.) wide and 2.0 m (6**1⁄2** ft) high.

Revision - 110.34(A)

Working Space and Guarding

■ **What Changed:** Section 110.34(A) was revised to address the condition of the work surface making up the floor, grade, or platform area within the working space of electrical equipment 1000 volts, nominal, and above.

■ **Its Effect:** This change will assist the electrical professional in applying the code requirements uniformly and avoiding any issues at the time of inspection. This situation needs to be addressed by the installer and authority having jurisdiction (AHJ) at the time of installation and inspection to assure safety during the life of the electrical installation.

(A) Working Space.

Except as elsewhere required or permitted in this *Code,* equipment likely to require examination, adjustment, servicing, or maintenance while energized shall have clear working space in the direction of access to live parts of the electrical equipment and shall be not less than specified in Table 110.34(A). Distances shall be measured from the live parts, if such are exposed, or from the enclosure front or opening if such are enclosed. The grade, floor, or platform in the required working space shall kept clear, and the floor, grade, or platform in the working space shall be as level and flat as practical for the entire depth and width of the working space.

Exception: Working space shall not be required in back of equipment such as switchgear or control assemblies where there are no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum working space of 762 mm (30 in.) horizontally shall be provided.

Table 110.34(A) Minimum Depth of Clear Working Space at Electrical Equipment

Nominal Voltage to Ground	**Minimum Clear Distance**		
	Condition 1	**Condition 2**	**Condition 3**
1001–2500 V	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)
2501–9000 V	1.2 m (4 ft)	1.5 m (5 ft)	1.8 m (6 ft)
9001–25,000 V	1.5 m (5 ft)	1.8 m (6 ft)	2.8 m (9 ft)
25,001 V–75 kV	1.8 m (6 ft)	2.5 m (8 ft)	3.0 m (10 ft)
Above 75 kV	2.5 m (8 ft)	3.0 m (10 ft)	3.7 m (12 ft)

Note: Where the conditions are as follows:
Condition 1 — Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.
Condition 2 — Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.
Condition 3 — Exposed live parts on both sides of the working space.

Chapter 2 Wiring and Protection

Articles 210 – 250

100 Definitions

110 Requirements for Electrical Installations

Relocation - 210.2

Reconditioned Equipment

■ **What Changed:** The information concerning reconditioned equipment has been relocated from 210.15 to 210.2 as it applies to branch circuits. (Note: the xxx.2 sections within various chapters will become placeholders for information concerning reconditioned equipment.)
■ **Its Effect:** The removal of redundant text and creating a standard location within various articles (xxx.02) containing information about reconditioned equipment will make the NEC more user-friendly.

210.2 Reconditioned Equipment.
~~Reconditioned equipment shall be listed as "reconditioned" and the original listing mark removed.~~ The following shall not be reconditioned:

1. Equipment that provides ground-fault circuit-interrupter protection for personnel
2. Equipment that provides arc-fault circuit-interrupter protection

Revision - 210.8(A)(6)

Dwelling Units- Kitchens

■ **What Changed:** Ground-fault circuit-interrupter (GFCI) protection has been expanded in Section 210.8(A)(6) to include any cord-and plug equipment in the kitchen, regardless of whether the outlet serves the countertop.

■ **Its Effect:** The electrical professional will need to be aware that GFCI protection is now required for all 125-volt through 250-volt receptacles within the kitchen and not just those that are serving countertop locations.

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

1. Bathrooms
2. Garages and also accessory buildings that have a floor located at or below grade level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use
3. Outdoors
4. Crawl spaces — at or below grade level
5. Basements

   ~~Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems. Receptacles installed under the exception to 210.8(A)(5) shall not be considered as meeting the requirements of 210.52(G).~~
6. Kitchens ~~— where the receptacles are installed to serve the countertop surfaces~~

New - 210.8(A)

Dwelling Unit Bathroom- Exception No. 4 Exhaust Fan Receptacle(s)

- **What Changed:** A new exception was added by to Section 210.8(A) to help the installer and enforcer understand ground-fault circuit-interrupter (GFCI) protection requirements for factory-installed exhaust fan receptacles. It was determined that these receptacles do not require GFCI protection unless required by the installation instructions or the listing.

- **Its Effect:** This exception should alleviate disagreements between the installer and the inspector regarding the need for GFCI protection for exhaust fan assemblies found in bathrooms within dwelling units.

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.
Exception No. 2: A receptacle supplying only a permanently installed ~~fire alarm or burglar alarm~~ premises security system shall ~~not be required to have~~ be permitted to omit ground-fault circuit-interrupter protection.
Exception No. 3: Listed ~~locking support and mounting~~ weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of ~~serving~~ supporting a ceiling luminaire or ceiling-suspended fan shall ~~not be required to be~~be permitted to omit ground-fault circuit-interrupter ~~protected~~protection. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.
Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to bathroom exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.
Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Relocation / Revision – 210.8(A)

Exception 3 and 210.8(B) GFCI Protection for Personnel

■ **What Changed:** Two new terms and acronyms utilized for "Weight Supporting Ceiling Receptacle (WSCR)" and "Weight Supporting Attachment Fitting (WSAF)". Also, 210.8(A) Exception 3 and 210.8(B) Exception 6, along with the others, were relocated to the end of 210.8(A) and 210.8(B) as part of the reorganization of 210.8.

■ **Its Effect:** The weight supporting ceiling receptacle, previously known as the "listed locking support and mounting receptacle" with associated "attachment fitting," has been in the NEC since the 2017 cycle and is available to installers. These changes should allow electrical professionals a much easier term to be used along with the acronym for the electrical industry.

Exception No. 3: Listed ~~locking support and mounting~~weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of ~~serving~~supporting a ceiling luminaire or ceiling-suspended fan shall ~~not be required to be~~be permitted to omit ground-fault circuit-interrupter ~~protected~~protection. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.
Exception No. 6: Listed ~~locking support and mounting~~weight-supporting ceiling receptacles ~~used~~(WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of serving a ceiling luminaire or ceiling-suspended fan shall ~~not~~ be ~~required to be GFCI protected~~permitted to omit GFCI protection. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.systems.

New – 210.8(B)(4)

Other Than Dwelling Units

■ **What Changed:** Buffet serving areas added to the list of locations requiring ground-fault circuit-interrupter (GFCI) protection in Section 210.8(B)(4). The buffet serving area typically contains various stainless steel food wells which hold hot water. Customers or staff members touching them are subject to electric shock in the event of an accident.

■ **Its Effect:** The electrical professional will need to ensure that any 125-volt through 250-volt receptacle supplied by a single-phase branch circuit and 150 volts or less to ground and 50 amperes or less is provided with GFCI protection. This addition will also apply to any receptacle supplied by three-phase branch circuits of 150 volts or less to ground, 100 amperes or less. It will provide protection from potential shock hazards at these locations.

(B) Other Than Dwelling Units.
All 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less, and all receptacles supplied by three-phase branch circuits rated 150 volts or less to ground, 100 amperes or less, installed in the following locations ~~specified in 210.8(B)(1) through (B)(12) shall have ground-fault circuit-interrupter protection for personnel.~~shall be provided with GFCI protection:

1. Bathrooms
2. Kitchens
3. ~~Kitchens or areas~~Areas with ~~a~~ sinks and permanent provisions for ~~either~~ food preparation, beverage preparation, or cooking
4. Buffet serving areas with permanent provisions for food serving, beverage serving, or cooking

New – 210.8(B)(7)

Other Than Dwelling Units, Sinks

■ **What Changed:** "Cord-and-plug-connected fixed and stationary appliances" were added to the existing language for sink locations. These

■ **Its Effect:** This change will require the electrical professional to provide GFCI protection for fixed or stationary appliances that are within 6 feet of the top inside edge of the bowl of a sink. Previously this measurement was taken from the top inside edge of the bowl of a sink to the receptacle to determine if GFCI protection was necessary. The electrical professional will need cooperation from the builder as to where fixed or stationary appliances will be located around sinks.

Sinks — where receptacles or cord-and-plug-connected fixed or stationary appliances are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink
~~Exception No. 1 to (7): In industrial establishments only, where the conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program in accordance with 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power is interrupted or that has a design not compatible with GFCI protection.~~
~~Exception No. 2 to (7): In industrial laboratories, receptacles used to supply equipment where removal of power would introduce a greater hazard shall be permitted to be installed without GFCI protection.~~
~~Exception No. 3 to (7): Receptacles located in patient bed locations of Category 2 (general care) or Category 1 (critical care) spaces of health care facilities shall be permitted to comply with 517.21.~~

New – 210.8(B)(13)

Other Than Dwelling Locations. (13) Aquariums and Bait Wells

■ **What Changed:** Section 210.8(B) added a new numbered list item (13) dealing with aquariums and bait wells in areas that are other than dwelling units. This change requires that receptacles installed within 1.8 m (6 ft.) of aquariums, bait wells, and similar open aquatic vessels or containers be provided with ground-fault circuit-interrupter (GFCI) protection.

■ **Its Effect:** The electrical professional will need to provide GFCI protection for these locations as a significant shock and electrocution hazard may exist.

(13) Aquariums, bait wells, and similar open aquatic vessels or containers, such as tanks or bowls, where receptacles are installed within 1.8 m (6 ft.) from the top inside edge or rim or from the conductive support framing of the vessel or container

Revision – 210.8(D)

Dwelling Units — Specific Appliances

■ **What Changed:** The appliance information at 210.8(D) requiring ground-fault circuit-interrupter (GFCI) protection was placed into a list format by CMP-2 for easier use. In the 2020 NEC, 210.8(D) did not include any specific appliances, rather it provided prescriptive requirements for achieving GFCI for appliances listed in a pointer to 422.5.

■ **Its Effect:** Users of the Code will find that appliances appear in a list format. New appliances on the list that require ground-fault circuit-interrupter (GFCI) protection include electric ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers, and microwave ovens. This will apply to a branch circuit or outlet supplied by 150 volts or less to ground and 60 amperes or less in a single-phase or three-phase system.

(D) Specific Appliances.
~~Unless GFCI protection is provided in accordance with 422.5(B)(3) through (B)(5), the outlets supplying the appliances specified in 422.5(A) shall have GFCI protection in accordance with 422.5(B)(1) or (B)(2).~~
~~Where the appliance is a vending machine as specified in 422.5(A)(5) and GFCI protection is not provided in accordance with 422.5(B)(3) or (B)(4), branch circuits supplying vending machines shall have GFCI protection in accordance with 422.5(B)(1) or (B)(2).~~GFCI protection shall be provided for the branch circuit or outlet supplying the following appliances rated 150 volts or less to ground and 60 amperes or less, single- or 3-phase:

1. Automotive vacuum machines
2. Drinking water coolers and bottle fill stations
3. High-pressure spray washing machines
4. Tire inflation machines
5. Vending machines
6. Sump pumps
7. Dishwashers
8. Electric ranges
9. Wall-mounted ovens
10. Counter-mounted cooking units
11. Clothes dryers
12. Microwave ovens

Revision – 210.8(F)

Outdoor Outlets

■ **What Changed:** A new requirement has been added to 210.8(F) that will require when equipment that is supplied by an outlet covered under the requirements of this section is replaced, the outlet shall be GFCI protected. This change addresses the issue of older existing outlets that are not GFCI protected when new or replacement equipment is provided. This change will increase the overall level of safety by providing the same level of protection as the new outlet.

■ **Its Effect:** Designers and installers should be prepared to provide the same level of GFCI protection for equipment installed in the areas specified in Section 210.8(F), regardless of whether the outlet is new or existing.

(F) Outdoor Outlets.
~~All~~For dwellings, all outdoor outlets ~~for dwellings, other than those covered in 210.8(A)(3), Exception to (3), that are~~ other than those covered in 210.8(A), Exception No. 1, including outlets installed in the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground or less, 50 amperes or less, shall ~~have ground-fault circuit-interrupter protection for personnel.~~ be provided with GFCI protection:

1. Garages that have floors located at or below grade level
2. Accessory buildings
3. Boathouses

If equipment supplied by an outlet covered under the requirements of this section is replaced, the outlet shall be supplied with GFCI protection.
Exception: ~~Ground-fault circuit-interrupter~~GFCI protection shall not be required on lighting outlets other than those covered in 210.8(C).

Revision – 210.11(C)(4)

210.11 Branch Circuits Required. (C) Dwelling Units. (4) Garage

■ **What Changed:** The text was revised at Section 210.11(C)(4) by CMP-2, clarifying that 15-ampere branch circuits are permitted to serve receptacle outlets installed in a dwelling unit garage that are in addition to the receptacle outlets required by 210.52(G)(1).

■ **Its Effect:** The previous edition of the NEC may have led the user of the Code to incorrectly deduce that all garage receptacles, even those not required by 210.52(G)(1), be on a 20-ampere rated branch circuit. This clarification will help all electrical professionals have a greater understanding of the requirements in this location.

210.11(C)(4)

(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, including those required by 210.52(G)(1) for attached garages and in detached garages with electric power. This circuit shall have no other outlets.
Additional branch circuits rated 15 amperes or greater shall be permitted to serve receptacle outlets other than those required by 210.52(G)(1).
Exception No. 1: This circuit shall be permitted to supply readily accessible outdoor receptacle outlets.
Exception No. 2: Where the 20-ampere circuit supplies a single vehicle bay garage, outlets for other equipment within the same garage shall be permitted to be supplied in accordance with 210.23(A)(1) and (A)(2).

New – 210.11(C)(4)

210.11 Branch Circuits Required. (C) Dwelling Units. (4) Garage Branch Circuits. Exception No. 2

■ **What Changed:** A new exception (4) was added to Section 210.11(C)(4), permitting the 20-ampere circuit supplying a single-vehicle bay garage to supply other equipment in accordance with requirements in 210.23(A)(1) and (A)(2).

■ **Its Effect:** By utilizing Exception No. 2, the electrical professional can utilize a single 20-ampere branch circuit to supply a single car attached garage rather than installing additional circuits for other equipment within the single car garage area.

(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, including those required by 210.52(G)(1) for attached garages and in detached garages with electric power. This circuit shall have no other outlets.
Additional branch circuits rated 15 amperes or greater shall be permitted to serve receptacle outlets other than those required by 210.52(G)(1).
Exception No. 1: This circuit shall be permitted to supply readily accessible outdoor receptacle outlets.
Exception No. 2: Where the 20-ampere circuit supplies a single vehicle bay garage, outlets for other equipment within the same garage shall be permitted to be supplied in accordance with 210.23(A)(1) and (A)(2).

New – 210.12

Arc-Fault Circuit-Interrupter Protection

- **What Changed:** This section was reformatted making it easier to reference and utilize the requirements as well as introduce 10-ampere branch circuits as an allowable branch circuit size.

- **Its Effect:** The reformatting of this section will be very helpful to the electrical professional when looking for various requirements that pertain to AFCI protection and the locations where this protection is required to be installed. The opportunity to utilize a 10-ampere branch circuit based on the specific requirements will also afford a degree of flexibility to the electrical professional.

210.12 Arc-Fault Circuit-Interrupter Protection

Arc-fault circuit-interrupter (AFCI) protection shall be ~~provided~~installed~~as required in 210.12(A), (B), (C), and (D)~~in accordance with 210.12(B) through (E) by any of the means described in 210.12(A)(1) through (A)(6). The ~~arc-fault circuit interrupter~~AFCI shall be listed and installed in a readily accessible location.

New – 210.12(D)(3)

Other Occupancies

■ **What Changed:** Added rooms designed exclusively as sleeping rooms in places such as firehouses, rescue squads, police departments, and similar locations to be protected by one of the methods in 210.12(A)(1) through (A)(6). As a result, a new list item (3) was added to Section 210.12(D).

■ **Its Effect:** This new requirement will result in AFCI protection being incorporated into the building design in firehouses, rescue squads, police departments, and similar locations with rooms used exclusively as sleeping rooms.

(1) General.
(D) ~~Guest Rooms, Guest Suites, and Patient Sleeping Rooms in Nursing Homes and Limited-Care Facilities~~Other Occupancies.
All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets ~~and~~or devices installed in guest rooms and guest suites of hotels and motels ~~and~~, and in areas used exclusively as patient sleeping rooms in nursing homes and limited-care facilities shall be protected by any of the means described in 210.12(A)(1) through (A)(6):

1. Guest rooms and guest suites of hotels and motels
2. Areas used exclusively as patient sleeping rooms in nursing homes and limited-care facilities
3. Areas designed for use exclusively as sleeping quarters in fire stations, police stations, ambulance stations, rescue stations, ranger stations, and similar locations.

Revision – 210.17

Guest Rooms and Guest Suites

■ **What Changed:** Section 210.17 was modified to include assisted living facilities to the list of existing locations (guest rooms and guest suites) that were provided with a permanent means for cooking requiring them to have their branch circuits installed per the requirements for dwelling units.

■ **Its Effect:** The electrical professional will need to be aware of these requirements when conducting electrical work for assisted living facilities. The list format will make this section more user-friendly in determining the locations that apply.

210.17 Guest Rooms and Guest Suites.
Guest rooms and guest suites in the following occupancies that are provided with permanent provisions for cooking shall have branch circuits installed to meet the rules for dwelling units:

1. Hotels
2. Motels
3. Assisted living facilities

Informational Note No. 1: See 210.11(C)(2) and 210.52(F), Exception No. 2, for information on laundry branch circuits and receptacle outlets.
Informational Note No. 2: See 3.3.198.12 and A.3.3.198.12(5) of NFPA 101-2021, Life Safety Code, for the definition of assisted living facilities.

Revision – 210.19

Conductors – Minimum Ampacity and Size

■ **What Changed:** Clarification that the voltage limitation should apply to the circuit, not the conductor insulation rating, and specified that Section 210.19 applies to branch circuits not exceeding 1000 volts ac or 1500 volts dc.

■ **Its Effect:** There was confusion in the field as to if the voltage limitation was applied to the circuit or if it applied to the insulation rating of the conductor. This has been clarified by the action of the code-making panel. Additionally, due to the creation of new Article 235, language was added at 210.19 stating that the section applies to not more than 1000 volts ac or 1500 volts dc. Article 235 will apply and address requirements for voltages over 1000 volts ac and 1500-volt dc.

210.19 Conductors — Minimum Ampacity and Size.
Branch circuit conductors for circuits not exceeding 1000 volts ac or 1500 volts dc shall be sized in accordance with 210.19(A) through (D).
Informational Note: Conductors for branch circuits as defined in Article 100, sized to prevent a voltage drop exceeding 3 percent at the farthest outlet of power, heating, and lighting loads, or combinations of such loads, and where the maximum total voltage drop on both feeders and branch circuits to the farthest outlet does not exceed 5 percent, provide reasonable efficiency of operation. See Informational Note No. 2 of 215.2(A)(1) for information on voltage drop on feeder conductors.
(A) General.
Branch-circuit conductors shall have an ampacity not less than the larger of ~~210.19(A)(1)(a) or (A)(1)(b)~~ the following and comply with 110.14(C) for equipment terminations:

1. Where a branch circuit supplies continuous loads or any combination of continuous and noncontinuous loads, the minimum branch-circuit conductor size shall have an ampacity not less than the noncontinuous load plus 125 percent of the continuous load in accordance with 310.14.

    Exception to (1): If the assembly, including the overcurrent devices protecting the branch ~~circuit(s)~~circuits, is listed for operation at 100 percent of its rating, the ampacity of the branch-circuit conductors shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load in accordance with 110.14(C).

2. The minimum branch-circuit conductor size shall have an ampacity not less than the maximum load to be served after the application of any adjustment or correction factors in accordance with 310.15.

    Exception to (1) and (2): Where a portion of a branch circuit is connected at both its supply and load ends to separately installed pressure connections as covered in 110.14(C)(2), ~~it shall be permitted to have~~ an allowable ampacity in accordance with 310.15 not less than the sum of the continuous load plus the noncontinuous load shall be permitted. No portion of a branch circuit installed under this exception shall extend into an enclosure containing either the branch-circuit supply or the branch-circuit load terminations.

~~**(B)** Branch Circuits Not More Than 600 Volts.~~

~~Informational Note No. 1: See 310.14 for ampacity and temperature limitations of conductors.~~

~~Informational Note No. 2: See Part II of Article 430 for minimum rating of motor branch-circuit conductors.~~

~~**(1)** General.~~

~~Branch-circuit conductors shall have an ampacity not less than the larger of 210.19(A)(1)(a) or (A)(1)(b) and comply with 110.14(C) for equipment terminations.~~

1. ~~Where a branch circuit supplies continuous loads or any combination of continuous and noncontinuous loads, the minimum branch-circuit conductor size shall have an ampacity not less than the noncontinuous load plus 125 percent of the continuous load in accordance with 310.14.~~
2. ~~The minimum branch-circuit conductor size shall have an ampacity not less than the maximum load to be served after the application of any adjustment or correction factors in accordance with 310.15.~~

~~*Exception No. 1 to (1)(a): If the assembly, including the overcurrent devices protecting the branch circuit(s), is listed for operation at 100 percent of its rating, the ampacity of the branch-circuit conductors shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load in accordance with 110.14(C).*~~

~~*Exception No. 2 to (1)(a) and (1)(b): Where a portion of a branch circuit is connected at both its supply and load ends to separately installed pressure connections as covered in 110.14(C)(*2), it shall be permitted to have an allowable ampacity, in accordance with 310.15, not less than the sum of the continuous load plus the noncontinuous load. No portion of a branch circuit installed under this exception shall extend into an enclosure containing either the branch-circuit supply or the branch-circuit load terminations.~~

~~**(E)** Branch Circuits Over 600 Volts.~~
~~The ampacity of conductors shall be in accordance with 310.14 and 311.60, as applicable. Branch-circuit conductors over 600 volts shall be sized in accordance with 210.19(B)(1) or (B)(2).~~
~~**(1)** General.~~
~~The ampacity of branch-circuit conductors shall not be less than 125 percent of the designed potential load of utilization equipment that will be operated simultaneously.~~
~~**(2)** Supervised Installations.~~
~~For supervised installations, branch-circuit conductor sizing shall be permitted to be determined by qualified persons under engineering supervision. Supervised installations are defined as those portions of a facility where both of the following conditions are met:~~

1. ~~Conditions of design and installation are provided under engineering supervision.~~
2. ~~Qualified persons with documented training and experience in over 600-volt systems provide maintenance, monitoring, and servicing of the system.~~

Revision – 210.23

Permissible Loads, Multiple-Outlet Branch Circuits, 10 Ampere Branch Circuits- Permitted and Not Permitted

■ **What Changed:** Information for the permitted and non-permitted use of a 10-ampere branch circuit has been developed and implemented into existing Section 210.23. Direction was necessary so that users of the Code understood how to install a 10-ampere branch circuit if they chose to do so. A 10-ampere load can supply lighting outlets, lighting circuits for bathroom and laundry area exhaust fans within dwelling units, and a gas fireplace unit served by an individual branch circuit. A 10-ampere branch circuit cannot supply receptacle outlets, fixed appliances (except as permitted for individual branch circuits), garage door openers, or laundry equipment.

■ **Its Effect:** For instances when the installer installs or the AHJ inspects an installation involving a 10-ampere branch circuit, the above information will provide guidance to ensuring a compliant installation. The installation of a 10-ampere branch circuit is a choice. If you install a 10-ampere branch circuit, follow the permitted and not permitted use guidelines set forth by the NEC.

210.23 Permissible Loads, Multiple-Outlet Branch Circuits.
In no case shall the load exceed the branch-circuit ampere rating. A branch circuit supplying two or more outlets or receptacles shall supply only the loads specified according to its size ~~as specified in~~in accordance with ~~210.23(B)~~210.23(A) through (~~D~~E) and as summarized in 210.24.~~ and Table 210.24.~~

(A) 10-Ampere Branch Circuits.
A 10-ampere branch circuit shall comply with the requirements of 210.23(A)(1) and (A)(2).

(1) Loads Permitted for 10-Ampere Branch Circuits.
A 10-ampere branch circuit shall be permitted to supply one or more of the following:

1. Lighting outlets
2. Dwelling unit exhaust fans on bathroom or laundry room lighting circuits
3. A gas fireplace unit supplied by an individual branch circuit

(2) Loads Not Permitted for 10-Ampere Branch Circuits.
A 10-ampere branch circuit shall not be permitted for any of the following:

1. Supplying receptacle outlets
2. Supplying fixed appliances, except as permitted for individual branch circuits
3. Supplying garage door openers
4. Supplying laundry equipment

Revision – 210.52(C)

Dwelling Units- Island and Peninsular Countertops and Work Surfaces

■ **What Changed:** The requirement for receptacles serving the countertop or work surface of an island or peninsula has been made optional in Section 210.52(C), but guidance for their location has been maintained when they are provided.

■ **Its Effect:** The installation of a receptacle outlet for these locations will now be optional. The receptacle outlet will no longer be allowed to be placed on the side of an island or peninsular location. If a receptacle is desired, it will need to be in or on the countertop or worksurface. This decision will be made by the builder, homeowner, and/or electrical contractor. A city ordinance or amendment might also modify these NEC requirements. In the event a receptacle outlet is not provided for the island or peninsular countertop or work surface, the electrical contractor must provide a method to the island or peninsula for the future addition of a receptacle outlet. This could be a raceway to the island or peninsula location or a wiring method (example: NM cable in a box with cover) left in an accessible location.

(C) Countertops and Work Surfaces.
In kitchens, pantries, breakfast rooms, dining rooms, and similar areas of dwelling units, receptacle outlets for countertop and work surfaces that are 300 mm (12 in.) or wider shall be installed in accordance with ~~210.52(C)(2)~~210.52(C)(1) through (C)(3) and shall not be considered as the receptacle outlets required by 210.52(A).
For the purposes of this section, where using multioutlet assemblies, each 300 mm (12 in.) of multioutlet assembly containing two or more receptacles installed in individual or continuous lengths shall be considered to be one receptacle outlet.
(1) Wall Spaces.
Receptacle outlets shall be installed so that no point along the wall line is more than 600 mm (24 in.) measured horizontally from a receptacle outlet in that space. The location of the receptacles shall be in accordance with 210.52(C)(3).
Exception No. 1: Receptacle outlets shall not be required directly behind a range, counter-mounted cooking unit, or sink in the installation described in Figure 210.52(C)(1).
Exception No. 2: Where a required receptacle outlet cannot be installed in the wall areas shown in Figure 210.52(C)(1), the receptacle outlet shall be permitted to be installed as close as practicable to the countertop area to be served. The total number of receptacle outlets serving the countertop shall not be less than the number needed to satisfy 210.52(C)(1). These outlets shall be located in accordance with 210.52(C)(3).

Revision – 210.52(G)

Basements, Garages, and Accessory Buildings

- **What Changed:** Clarification that the receptacle provided for premises security systems did not meet the receptacle requirements of 210.52(G).

- **Its Effect:** This change should correct any misunderstanding between installers and the authority having jurisdiction (AHJ) about the requirements for a GFCI receptacle outlet in the above locations that might also contain a premises security system.

(G) Basements, Garages, and Accessory Buildings
For one- and two-family dwellings, and multifamily dwellings, at least one receptacle outlet shall be installed in the areas specified in 210.52(G)(1) through (G)(3). These receptacles shall be in addition to receptacles required for specific equipment. Receptacles supplying only a permanently installed premises security system shall not be considered as meeting these requirements.

Revision – 210.70

Lighting Outlets Required. (1) Habitable Rooms, Kitchens, Laundry Areas, and Bathrooms.

■ **What Changed:** Added laundry areas to the existing list of locations in 210.70(1), requiring a listed wall-mounted control device to be installed for the lighting outlet. Language was also added prohibiting a switch or wall-mounted control device to rely solely on a battery unless provided with a means to energize lighting outlets upon failure.

■ **Its Effect:** It is uncertain that this will have an impact on the electrical industry. It has been observed that many installers have already been installing a wall-mounted switch at the entrance of the laundry area to control the laundry area luminaire. By adding the laundry area to the existing locations (every habitable room, kitchen, and bathroom), the Code specifically requires this to be done.

210.70 Lighting Outlets Required.
Lighting outlets shall be installed where specified in 210.70(A), (B), and (C).
(A) Dwelling Units.
In dwelling units, lighting outlets shall be installed in accordance with 210.70(A)(1) and (A)(2).
(1) Habitable Rooms.
At least one lighting outlet controlled by a listed wall-mounted control device shall be installed in every habitable room, kitchen, <u>laundry area,</u> and bathroom. The wall-mounted control device shall be located near an entrance to the room on a wall.
Exception No. 1: In other than kitchens<u>, laundry areas,</u> and bathrooms, one or more receptacles controlled by a listed wall-mounted control device shall be permitted in lieu of lighting outlets.
<u>Exception No. 2: Lighting outlets shall be permitted to be controlled by occupancy sensors that are (1) in addition to listed wall-mounted control devices or (2) located at a customary wall switch location and equipped with a manual override that will allow the sensor to function as a wall switch</u>.

New - 215.15

Barriers

■ **What Changed:** New Section 215.15 was added that feeder taps or transformer secondary conductors supply panelboards, switchboards, switchgear, or motor control centers, there must be added barriers at load terminations when such terminations remain energized when the disconnect for the taps (or transformer secondary conductors) is in the off (open) position. As a result, a.

■ **Its Effect:** The new barrier requirements will provide additional safety for electrical workers. The barriers that we have seen for services were an easy and inexpensive fix, and there's potential to expand such requirements to include all disconnects and panelboards in future code cycles.

> **215.15 Barriers.**
> Barriers shall be placed such that no uninsulated, ungrounded busbar or terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations in panelboards, switchboards, switchgear, or motor control centers supplied by feeder taps in 240.21(B) or transformer secondary conductors in 240.21(C) with the disconnecting device, to which the tap conductors are terminated, in the open position.

Revision / New - 215.18, 225.42, 230.67

Surge Protection

■ **What Changed:** The requirements of 230.67 of the 2020 NEC were expanded for the 2023 NEC and added two new Sections 215.18 and 225.42. The new language requires Type 1 or 2 SPDs when a service or feeder supplies a dwelling unit, dormitory unit, guest rooms of hotels and motels, and sleeping rooms/areas of nursing homes and limited care facilities. The new requirements also specify that SPDs must have a nominal discharge rating of not less than 10kA.

■ **Its Effect:** There will be added costs for installing the SPDs, especially for dormitory units, guest rooms of hotels and motels, and sleeping rooms/areas of nursing homes and limited care facilities. However, the safety of such electrical systems will be improved, and public safety enhanced.

215.18 Surge Protection.

(A) Surge-Protective Device.

Where a feeder supplies any of the following, a surge-protective device (SPD) shall be installed:

Dwelling units

Dormitory units

Guest rooms and guest suites of hotels and motels

Areas of nursing homes and limited-care facilities used exclusively as patient sleeping rooms

(B) Location.

The SPD shall be installed in or adjacent to distribution equipment , connected to the load side of the feeder, that contains branch circuit overcurrent protective device(s) that supply the location specified in 215.18(A).

Informational Note: Surge protection is most effective when closest to the branch circuit. Surges can be generated from multiple sources including, but not limited to, lightning, the electric utility, or utilization equipment.

(C) Type.

The SPD shall be a Type 1 or Type 2 SPD.

(D) Replacement.

Where the distribution equipment supplied by the feeder is replaced, all of the requirements of this section shall apply.

(E) Ratings.

SPDs shall have a nominal discharge current rating (In) of not less than 10kA.

Informational Note: Lead lengths of conductors to the SPD should be kept as short as possible to reduce let-through voltages.

New - 220.1

Scope. (Branch-Circuit, Feeder, and Service Load Calculations)

■ **What Changed:** Information added about new parts VI and VII to the Scope of Article 220 concerning calculation methods for health care facilities and marinas, boatyards, floating buildings, and commercial and noncommercial docking facilities. There are also new requirements in 220.110 that provides relief for load calculations in health care facilities.

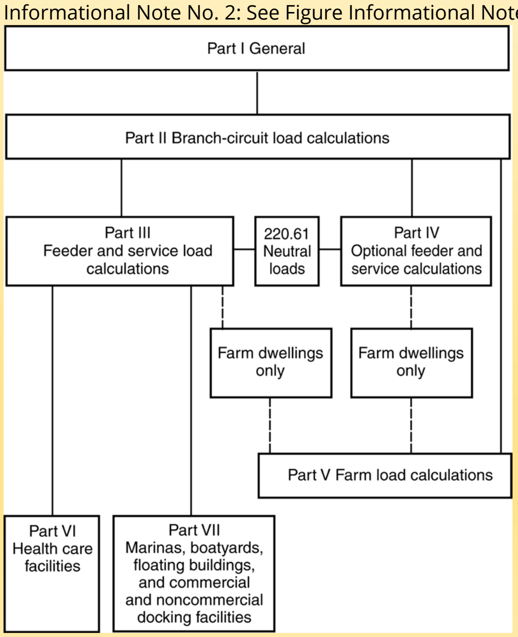
■ **Its Effect:** Periodically there is a need to create new parts to NEC articles. That was the case for this change alerting the electrical professional about the calculation locations for health care facilities (Part VI) and marinas, boatyards, floating buildings, and commercial and noncommercial docking facilities (Part VII).

220.1 Scope.

This article provides requirements for calculating branch-circuit, feeder, and service loads. Part I provides general requirements for calculation methods. Part II provides calculation methods for branch-circuit loads. Part~~s~~ III and Part IV provide calculation methods for feeder and service loads. Part V provides calculation methods for farm loads. Part VI provides calculation methods for health care facilities. Part VII provides calculation methods for marinas, boatyards, floating buildings, and commercial and noncommercial docking facilities.

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

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



New - 220.5(C)

Floor Areas

■ **What Changed:** Areas such as garages, or unused or unfinished space(s) are no longer excluded from the calculated floor area of the building, dwelling unit, or other areas. A new subdivision (C) was added to Section 220.5(C), Floor Areas.

■ **Its Effect:** The electrical professional will need to be aware that this change will increase the calculated load for dwelling units, buildings, and other spaces that depend on square foot calculations when determining the load.

(C) Floor Area.
The floor area for each floor shall be calculated from the outside dimensions of the building, dwelling unit, or other area involved. For dwelling units, the calculated floor area shall not include open porches~~, garages, or unused or unfinished spaces not adaptable for future use.~~ or unfinished areas not adaptable for future use as a habitable room or occupiable space.

New - 220.57

Electric Vehicle Supply Equipment (EVSE) Load

■ **What Changed:** New Section 220.57 added to specify load calculations for Electric Vehicle Supply Equipment (EVSE). A 7200-volt-ampere (VA) minimum requirement was chosen and is based on a 30 ampere, 240-volt, single-phase circuit. This language specifies the use of 7200 volt-amperes or the VA rating from the nameplate of the equipment, whichever is the larger of the two.

■ **Its Effect:** Guidance was needed for electrical professionals as to the minimum volt-ampere requirements for EVSE. Oversizing these requirements is costly and burdensome for installers of this equipment. This new section should provide the user of the Code with the necessary information to install and inspect this equipment.

220.57 Electric Vehicle Supply Equipment (EVSE) Load.
The EVSE load shall be calculated at either 7200 watts (volt-amperes) or the nameplate rating of the equipment, whichever is larger.

New - 220.70

Energy Management Systems (EMSs)

■ **What Changed:** New Section 220.70 added to specify load calculations for Energy
Management Systems (EMSs).

■ **Its Effect:** Energy management systems are becoming very popular. Some university apartments utilize systems like this to gauge the usage of electricity by the occupants within these apartments. If there are four bedrooms, each occupant has a set predetermined amount of electricity they can use. In the event a tenant exceeds their predetermined monthly usage amount, a bill for the additional usage is sent to the tenant. The electrical professional needs to be familiar with these systems and understand specific requirements for their installation.

220.70 Energy Management Systems (EMSs).
If an energy management system (EMS) is used to limit the current to a feeder or service in accordance with 750.30, , a single value equal to the maximum ampere setpoint of the EMS shall be permitted to be used in load calculations for the feeder or service.
The setpoint value of the EMS shall be considered a continuous load for the purposes of load calculations

New - 220.110

Receptacle Loads

- **What Changed:** Added new tables, Table 220.110(1) and Table 220.110(2 with demand factor values for receptacles used in Category 1, 2, 3, and 4 patient care spaces within Health Care Facilities.

- **Its Effect:** New Table 220.110(1) and Table 220.110(2) provide the electrical professional demand factor information for receptacles supplied by general-purpose branch circuits in Category 1, 2, 3, and 4 patient care spaces.

Part VI. Health Care Facilities

220.110 Receptacle Loads~~ — Health Care Facilities~~.

Receptacle loads calculated in accordance with 220.14(H) and (I) and supplied by branch circuits not exceeding 150 volts to ground shall be permitted to be subjected to the demand factors provided in Table 220.110(1) and Table 220.110(2) for health care facilities.

Informational Note No. 1: See Article 100 for the definitions of patient care space categories.

Informational Note No. 2: See 220.14(I) for the calculation of receptacle outlet loads.

Table 220.110(1) Demand Factors for ~~Health Care Receptacle Loads~~Receptacles Supplied by General-Purpose Branch Circuits in Category 1 and Category 2 Patient Care Spaces

Portion of Receptacle Load to Which Demand Factor Applies (Volt-Amperes)	Demand Factor (%)
First ~~7500~~5000 or less	~~125~~100
From ~~7501~~5001 to 10,000	~~100~~50
~~From 10,001 to 15,000~~	~~50~~
Remainder over ~~15,000~~10,000	~~45~~25

Table 220.110(2) Demand Factors for Receptacles Supplied by General-Purpose Branch Circuits in Category 3 and Category 4 Patient Care Spaces

Portion of Receptacle Load to Which Demand Factor Applies (Volt-Amperes)	Demand Factor (%)
First 10,000 or less	100
Remainder over 10,000	50

Relocation - 220.120

Marinas, Boatyards, Floating Buildings, and Commercial and Noncommercial Docking Facilities

■ **What Changed:** The requirements of Section 555.6 have been moved to 220.120. This will not change the requirements for load calculations or demand factors and is a simple relocation.

■ **Its Effect:** This change seeks to simplify the use of the NEC by placing load calculation and demand factor requirements for marinas, boatyards, floating buildings, and commercial and noncommercial docking facilities in the article that contains this information. The Code user will need to be aware that this information has been moved to a new location for the 2023 code cycle.

Part VII. Marinas, Boatyards, Floating Buildings, and Commercial and Noncommercial Docking Facilities

220.120 Receptacle Loads.

General lighting and other loads in marinas, boatyards, floating buildings, and commercial and noncommercial docking facilities shall be calculated in accordance with Part III of this article and, in addition, the demand factors set forth in Table 220.120 shall be permitted for each service or feeder circuit supplying receptacles that provide shore power for boats. These calculations shall be permitted to be modified as indicated in Notes (1) and (2) of Table 220.120. Where demand factors of Table 220.120 are applied, the demand factor specified in 220.61(B) shall not be permitted.

Informational Note: These demand factors could be inadequate in areas of extreme hot or cold temperatures with loaded circuits for heating, air-conditioning, or refrigerating equipment.

Table 220.120 Demand Factors for Shore Power Receptacle Loads

Number of Shore Power Receptacles	Sum of the Rating of the Receptacles (%)
1–4	100
5–8	90
9–14	80
15–30	70
31–40	60
41–50	50
51–70	40
≥71	30

Notes:

1. Where shore power accommodations provide two receptacles specifically for an individual boat slip and these receptacles have different voltages (e.g., one 30-ampere, 125-volt and one 50-ampere, 125/250-volt), only the receptacle with the larger kilowatt demand shall be required to be calculated.
2. For each shore powered pedestal being installed that includes an individual kilowatt-hour submeters for each slip and is being calculated using the criteria listed in Table 220.120, the total demand amperes shall be permitted to be multiplied by 0.9 to achieve the final demand amperes of the facility.
3. If a circuit feeding a boat hoist and shore power for the same boat slip is shared, only the load with the larger kilowatt demand shall be required to be counted in the load calculation.

Deletion - 225.5 and 225.7

225.5 Size of Conductors, 1000 Volts, Nominal, or Less and 225.7 Lighting Equipment Installed Outdoors

■ **What Changed:** Sections 225.5, Size of Conductors 1000 Volts, Nominal, or Less, and 225.7, Lighting Equipment Installed Outdoors, were deleted. Section 225.5 was redundant since such requirements can be found in Articles 215 and 220. Section 225.7 was also redundant since such requirements can be found in Articles 210 and 220.

■ **Its Effect:** There will likely be little or no effect to the electrical industry as these requirements are still part of the NEC but located in other locations.

~~**225.5** Size of Conductors 1000 Volts, Nominal, or Less.~~

~~The ampacity of outdoor branch-circuit and feeder conductors shall be in accordance with 310.14 based on loads as determined under 220.10 and Part III of Article 220.~~

~~**225.7** Lighting Equipment Installed Outdoors.~~

~~**(A)** General.~~

~~For the supply of lighting equipment installed outdoors, the branch circuits shall comply with Article 210 and 225.7(B) through (D).~~

~~**(B)** Common Neutral.~~

~~The ampacity of the neutral conductor shall not be less than the maximum net calculated load current between the neutral conductor and all ungrounded conductors connected to any one phase of the circuit.~~

~~**(C)** 277 Volts to Ground.~~

~~Circuits exceeding 120 volts, nominal, between conductors and not exceeding 277 volts, nominal, to ground shall be permitted to supply luminaires for illumination of outdoor areas of industrial establishments, office buildings, schools, stores, and other commercial or public buildings.~~

~~**(D)** 1000 Volts Between Conductors.~~

~~Circuits exceeding 277 volts, nominal, to ground and not exceeding 1000 volts, nominal, between conductors shall be permitted to supply the auxiliary equipment of electric-discharge lamps in accordance with 210.6(D)(1).~~

New - 225.41

Emergency Disconnects

■ **What Changed:** The new section was added to require an emergency disconnect at a readily accessible outdoor location for one-and two-family dwelling units that are served by feeders. The disconnect must be on or within sight of the dwelling unit. It was recognized that a one-and two-family dwelling unit is/are not always fed directly by a service but instead by an outdoor feeder. The requirement was added to ensure that all new one-and two-family dwelling units are provided with an emergency disconnect located at a readily accessible outdoor location. The emergency disconnect must be marked as "EMERGENCY DISCONNECT." A plaque
or directory must also be provided adjacent to the emergency disconnect identifying the location(s) of any other energy source disconnect on the premises.

■ **Its Effect:** Section 225.41 will help increase the safety of an electrical system by providing first responders (and others) easy access to shut down the electrical system (and other sources of power on the premises) for a one- and two-family dwelling.

225.41 Emergency Disconnects.
For one-and two-family dwelling units, an emergency disconnecting means shall be installed.
(A) General.
(1) Location.
The disconnecting means shall be installed in a readily accessible outdoor location on or within sight of the dwelling unit.
(2) Rating.
The disconnecting means shall have a short-circuit current rating equal to or greater than the available fault current.
(3) Grouping.
If more than one disconnecting means is provided, they shall be grouped.
(B) Identification of Other Emergency Disconnects.
Where emergency disconnects are installed for other systems that are not located adjacent to the emergency disconnect required by this section, a plaque or directory identifying the location of all emergency disconnects shall be located adjacent to the disconnecting means required by this section.
(C) Marking.
The disconnecting means shall be marked as EMERGENCY DISCONNECT. Markings shall comply with 110.21(B) and all of the following:

1. The marking or labels shall be located on the outside front of the disconnect enclosure with red background and white text.
2. The letters shall be least 13 mm (**1⁄2** in.) high.

Revision - 230.62(C)

Barriers

■ **What Changed:** New language was added to clarify that barriers are required in service equipment in such a way that no uninsulated, ungrounded busbars or terminals is/ are exposed to inadvertent contact while load terminations are being serviced when the service disconnect is in the open position.

■ **Its Effect:** This change adds clarity on when the barriers are required. The barriers greatly increase safety for electrical professionals working on service equipment.

> **(C)** Barriers.
> Barriers shall be placed in service equipment such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations <u>with the service disconnect in the open position</u>.

Revision - 230.67(A)

Surge-Protective Devices

■ **What Changed:** Subdivision 230.67(A) revised by changing the term dwelling units to the following occupancies and added a list of additional locations that now require protection by a surge-protective device (SPD).

■ **Its Effect:** The electrical professional will need to be aware of the new occupancies requiring surge protection. The installer and inspector (AHJ) are key elements in providing this protection and ensuring surge protection is installed and providing this much-needed protection. These new occupancies requiring protection from surges will also help protect both life and property.

230.67 Surge Protection.
(A) Surge-Protective Device.
All services supplying ~~dwelling units~~the following occupancies shall be provided with a surge-protective device (SPD)~~.~~:

1. Dwelling units
2. Dormitory units
3. Guest rooms and guest suites of hotels and motels
4. Areas of nursing homes and limited-care facilities used exclusively as patient sleeping rooms

Informational Note: See 517.10(B)(2).
(B) Location.
The SPD shall be an integral part of the service equipment or shall be located immediately adjacent thereto.
Exception: The SPD shall not be required to be located in the service equipment as required in 230.67(B)~~(B)~~ if located at each next level distribution equipment downstream toward the load.
(C) Type.
The SPD shall be a Type 1 or Type 2 SPD.
(D) Replacement.
Where service equipment is replaced, all of the requirements of this section shall apply.

Revision - 230.71(B)

Two to Six Service Disconnecting Means

■ **What Changed:** Transfer switches were added at 230.71(B)(4) to clarify that they must be listed for and used as service equipment. Each service disconnect is to be provided in a separate compartment. Section 230.71(B)(6) was added for motor control centers used as service equipment to limit such equipment to a maximum of two service disconnects per single motor control center with barriers required between each unit or compartment containing a service disconnect.

■ **Its Effect:** These changes will increase safety for electrical professionals servicing load terminations in different types of service equipment and not just in service equipment that is traditionally used.

New - 230.71(B)

Exception Two to Six Service Disconnecting Means

■ **What Changed:** An exception was added to clarify that existing service equipment is not required to comply with the provisions of 230.71(B) when such existing equipment was installed in compliance with previous editions of the NEC that allowed for up to six service disconnects in a single enclosure or compartment.

■ **Its Effect:** The added exception will help prevent misinterpretations within the electrical professional community of when existing service equipment is required to be upgraded.

(B) Two to Six Service Disconnecting Means.
Two to six service disconnects shall be permitted for each service permitted by 230.2 or for each set of service-entrance conductors permitted by 230.40, Exception No. 1, 3, 4, or 5. The two to six service disconnecting means shall be permitted to consist of a combination of any of the following:

1. Separate enclosures with a main service disconnecting means in each enclosure.
2. Panelboards with a main service disconnecting means in each panelboard enclosure.
3. Switchboard(s) where there is only one service disconnect in each separate vertical section ~~where there are barriers separating each vertical section~~ with barriers provided between each vertical section to maintain the inadvertent contact protection required in 230.62 based on access from the adjacent section(s).
4. Service disconnects in switchgear, transfer switches, or metering centers where each disconnect is located in a separate compartment.
5. Metering centers with a main service disconnecting means in each metering center.
6. Motor control center(s) where there is only one service disconnect in a motor control center unit and a maximum of two service disconnects provided in a single motor control center with barriers provided between each motor control center unit or compartment containing a service disconnect to maintain the inadvertent contact protection required in 230.62 based on access from adjacent motor control center unit(s) or compartment(s).

Exception to (2), (3), (4), (5), and (6): Existing service equipment, installed in compliance with previous editions of this Code that permitted multiple service disconnecting means in a single enclosure, section, or compartment, shall be permitted to contain a maximum of six service disconnecting means.

Informational Note No. 1: ~~Metering centers are addressed in~~See UL 67, *Standard for Panelboards*, for information on metering centers.

Informational Note No. 2: Examples of separate enclosures with a main service disconnecting means in each enclosure include but are not limited to motor control centers, fused disconnects, and circuit breaker enclosures.~~, and transfer switches that are suitable for use as service equipment.~~

Informational Note No. 3: Transfer switches are provided with one service disconnect or multiple service disconnects for multiple services in separate compartments

Revision - 230.85

Emergency Disconnects

■ **What Changed:** Section 230.85 was reorganized into subdivisions with titles to better align with the formatting requirements of the NEC Style Manual.

■ **Its Effect:** The provisions of 230.85 for emergency disconnects will be better understood by the electrical professional due to the clarifications and reorganization of the requirements. The emergency disconnect(s) will help increase the safety of an electrical system by providing first responders (and others) easy access to shut down the electrical system (and other sources of power on the premises) for a one- and two-family dwelling.

230.85 Emergency Disconnects.
For one- and two-family dwelling units, ~~all service conductors shall terminate in disconnecting means having a short-circuit current rating equal to or greater than the available fault current, installed in a readily accessible outdoor location. If more than one disconnect is provided, they shall be grouped. Each disconnect shall be one of the following:~~ an emergency disconnecting means shall be installed.

1. ~~Service disconnects marked as follows:~~
   ~~EMERGENCY DISCONNECT,~~
   ~~SERVICE DISCONNECT~~
2. ~~Meter disconnects installed per 230.82(3) and marked as follows:~~
   ~~EMERGENCY DISCONNECT,~~
   ~~METER DISCONNECT,~~
   ~~NOT SERVICE EQUIPMENT~~
3. ~~Other listed disconnect switches or circuit breakers on the supply side of each service disconnect that are suitable for use as service equipment and marked as follows:~~
   ~~EMERGENCY DISCONNECT,~~
   ~~NOT SERVICE EQUIPMENT~~

Reference NEC for complete Text

New / Relocation - Article 235

Branch Circuits, Feeders and Services Over 1000 Volts ac, 1500 Volts dc, Nominal

■ **What Changed:** New Article 235 was added to govern medium voltage branch circuits. It was determined that a new Article 235 would become the placeholder
for information pertaining to medium voltage branch circuits that were located throughout the NEC. This article also includes requirements for feeders and services and is separated into individual parts throughout the article.

■ **Its Effect:** The user of the Code will have a one-stop location in Article 235 to find requirements for branch circuits over 1000 volts ac, 1500 volts dc, nominal commonly referred to as medium voltage branch circuits. This should promote greater usability of the NEC as it applies to this topic.

Article 235 Branch Circuits Over 1000 Volts ac, 1500 Volts dc, Nominal

235.1 Scope.

This article includes general requirements for installations for branch circuits over 1000 volts ac or 1500 volts dc, nominal.

Reference NEC for complete Text

Relocation - 240.2

Reconditioned Equipment

■ **What Changed:** The reconditioning requirements located at 240.62 and 240.88 were relocated to Section 240.2 in the 2023 NEC. Ground-fault protection of equipment (GFPE) and ground-fault circuit interrupters (GFCI) were added to the list of equipment that shall not be reconditioned.

■ **Its Effect:** The changes add usability to the NEC and increase safety for electrical systems by ensuring that when existing GFPE or GFCIs are replaced, they're replaced with new and listed equipment.

240.2 Reconditioned Equipment.

(A) **Reconditioning Not Permitted.**
The following equipment shall not be reconditioned:

(1) Equipment providing ground-fault protection of equipment

(2) Ground-fault circuit interrupters

(3) Low-voltage fuseholders and low-voltage nonrenewable fuses

(4) Molded-case circuit breakers

(5) Low-voltage power circuit breaker electronic trip units.

(B) **Reconditioning Permitted.**
The following equipment shall be permitted to be reconditioned:

(1) Low-voltage power circuit breakers

(2) Electromechanical protective relays and current transformers

Reconditioned equipment shall be listed as reconditioned and comply with 110.21(A)(2).

Revision - 240.4(B)

Overcurrent Devices Rated 800 Amperes or Less

■ **What Changed:** Adjustable trip overcurrent protective devices added as being permitted to have an ampacity value set that does not exceed the next higher standard overcurrent protection device ampacity value [per Table 240.6(A)] above the ampacity of the conductors being protected.

■ **Its Effect:** This change adds flexibility for designers and electrical professionals when choosing overcurrent protection devices for electrical systems.

(B) Overcurrent Devices Rated 800 Amperes or Less.
The next higher standard overcurrent device rating (above the ampacity of the conductors being protected) shall be permitted to be used, provided all of the following conditions are met:

1. The conductors being protected are not part of a branch circuit supplying more than one receptacle for cord-and-plug-connected portable loads.
2. The ampacity of the conductors does not correspond with the standard ampere rating of a fuse or a circuit breaker without overload trip adjustments above its rating (but that shall be permitted to have other trip or rating adjustments).
3. The next higher standard rating selected does not exceed 800 amperes.

<u>If the overcurrent protective device is an adjustable trip device, installed in accordance with 240.4(B)(1), (B)(2), and (B)(3), it shall be permitted to be set to a value that does not exceed the next higher standard value above the ampacity of the conductors being protected as shown in Table 240.6(A) where restricted access in accordance with 240.6(C) is provided.</u>

Revision - 240.4(D)(3)

14 AWG Copper-Clad Aluminum

■ **What Changed:** 14 AWG copper-clad aluminum was added to the list of small conductors permitted per NEC 240.4(D).14 AWG copper-clad aluminum was added to align with other small conductors permitted per 240.4(D). The overcurrent protection device rating for the conductors cannot exceed 10 amperes, and the maximum continuous load on the circuit cannot exceed 8 amperes. Additionally, any branch-circuit-rated breakers or fuses that the conductors connect to must be listed and marked for use with such conductors.

■ **Its Effect:** This change will offer the electrical industry more flexibility when choosing types of conductors to install for certain circuits.

(D) Small Conductors.
(3) 14 AWG Copper-Clad Aluminum.
10 amperes, provided all the following conditions are met:

1. Continuous loads do not exceed 8 amperes
2. Overcurrent protection is provided by one of the following:
    1. Branch-circuit-rated circuit breakers are listed and marked for use with 14 AWG copper-clad aluminum conductor.
    2. Branch-circuit-rated fuses are listed and marked for use with 14 AWG copper-clad aluminum conductor.

Revision - Table 240.6(A)

Standard Ampere Ratings for Fuses and Inverse Time Circuit Breakers

■ **What Changed:** 10 ampere was added to the list of standard ratings of overcurrent protection devices.

■ **Its Effect:** This change offers more flexibility to the electrical industry when choosing overcurrent protection devices for certain circuits.

(A) Fuses and Fixed-Trip Circuit Breakers.
The standard ampere ratings for fuses and inverse time circuit breakers shall be considered 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)(a) Standard Ampere Ratings for Fuses and Inverse Time Circuit Breakers~~

~~**Standard Ampere Ratings**~~				
~~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~~	~~—~~	~~—~~	~~—~~

Table 240.6(A) Standard Ampere Ratings for Fuses and Inverse Time Circuit Breakers

Standard Ampere Ratings				
10	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	—	—

Revision - 240.6(D)

Remotely Accessible Adjustable-Trip Circuit Breakers

■ **What Changed:** Provisions were added to allow remote access to adjustable-trip circuit breakers through a direct local nonnetworked interface or a networked interface connection.
Due to the increased use of SMART devices, provisions were needed to address cybersecurity. It should be clarified that the requirements were added in relation to safety and not concerns about privacy or data protection. When the connection is through a networked interface, the circuit breaker and associated software must be evaluated for cybersecurity, OR a cybersecurity assessment of the network is required to be completed, and documentation of such assessment must be provided to those authorized to inspect, operate and maintain the system.

■ **Its Effect:** The new requirements will increase the protection of remotely accessible adjustable-trip circuit breakers from cyberattacks. The authority having jurisdiction (AHJ) should be prepared to request assessment documentation from the installer or designer stating the network has been evaluated for cybersecurity.

(D) Remotely Accessible Adjustable-Trip Circuit Breakers.
A circuit breaker(s) that is can be adjusted remotely to modify the adjusting means shall be permitted to have an ampere rating(s) that is equal to the adjusted current setting (long-time pickup setting). Remote access shall be achieved by one of the following methods:

1. Connected directly through a local nonnetworked interface.
2. Connected through a networked interface complying with one of the following methods:
    1. The circuit breaker and associated software for adjusting the settings are identified as being evaluated for cybersecurity.
    2. A cybersecurity assessment of the network is completed. Documentation of the assessment and certification shall be made available to those authorized to inspect, operate, and maintain the system.

Informational Note No. 1: See ANSI/ISA 62443, *Cybersecurity Standards series*, UL 2900 *Cybersecurity Standard series*, or the NIST *Framework for Improving Critical Infrastructure Cybersecurity*, Version 1.1 for assessment requirements.
Informational Note No. 2: Examples of the commissioning certification used to demonstrate the system has been investigated for cybersecurity vulnerabilities could be one of the following:

1. The ISA Security Compliance Institute (ISCI) conformity assessment program
2. Certification of compliance by a nationally recognized test laboratory
3. Manufacturer certification for the specific type and brand of system provided

Informational Note No. 3: Cybersecurity is a specialized field requiring constant, vigilant attention to security vulnerabilities that could arise due to software defects, system configuration changes, or user interactions. Installation of devices that can be secured is an important first step but not sufficient to guarantee a secure system.

New - 240.7

Listing Requirements

■ **What Changed:** Clarification in the new Section 240.7, that branch-circuit overcurrent protective devices, relays, and circuit breakers that provide ground-fault protection of equipment (GFPE) and ground-fault circuit interrupter (GFCI) devices must be listed.

■ **Its Effect:** The change will likely have little effect on the electrical industry since such devices have been required to be listed for a long time, even though the NEC never previously specified that they needed to be listed.

240.7 Listing Requirements.
The following shall be listed:

1. Branch-circuit overcurrent protective devices
2. Relays and circuit breakers providing ground-fault protection of equipment
3. Ground-fault circuit interrupter devices

New - 240.11

Selective Coordination

■ **What Changed:** A requirement was added to clarify that whenever the NEC requires a feeder overcurrent protective device to be selectively coordinated with a service overcurrent protective device, then ALL feeder overcurrent devices connected to such service must be selectively coordinated with the service overcurrent device.

■ **Its Effect:** This change will increase the safety of electrical systems that are required to be selectively coordinated by ensuring that the service overcurrent protective device is less likely to open since all feeder overcurrent protective devices are included in the coordination study. This will add clarity and enhance useability to the NEC for the electrical industry.

240.11 Selective Coordination.
If one or more feeder overcurrent protective devices are required to be selectively coordinated with a service overcurrent protective device by other requirements in this *Code*, all feeder overcurrent protective devices supplied directly by the service overcurrent protective device shall be selectively coordinated with the service overcurrent protective device.

New - 240.16

Interrupting Ratings

- **What Changed:** A new requirement was added at Section 240.16 to specify that the minimum interrupting rating of a branch-circuit overcurrent protective device is 5,000 amperes.

- **Its Effect:** This change will not affect the type of overcurrent protective devices installed. Having the requirement in a code section will allow users of the Code easier access to the requirement.

240.16 Interrupting Ratings.
Branch-circuit overcurrent protective devices shall have an interrupting rating no less than 5000 amperes.

Revision - .24(A)

Accessibility - Exception.

■ **What Changed:** Exception to Section 240.24(A) was updated replacing the words "similar enclosures" due to the words being vague and problematic for the enforcement community. The exception clarifies that when it is applied, any readily accessible requirements that would normally apply to the overcurrent devices must still be applied to the enclosure itself. This includes any enclosed device(s) with the door or cover in the open position.

■ **Its Effect:** This exception helps to clarify the requirement's intent and will also aid in enforcement consistency. The electrical professional will benefit from more specific language that is less confusing to apply to electrical installations.

(A) Accessibility.
Circuit breakers and switches containing fuses shall be readily accessible and installed so that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, is not more than 2.0 m (6 ft 7 in.) above the floor or working platform, unless one of the following applies:

1. For busways, as provided in 368.17(C).
2. For supplementary overcurrent protection, as described in 240.10.
3. For overcurrent protective devices, as described in 225.40 and 230.92.
4. For overcurrent protective devices adjacent to utilization equipment that they supply, access shall be permitted to be by portable means.

Exception: The use of a tool shall be permitted to access overcurrent protective devices located within listed industrial control panels, ~~or similar enclosures~~within enclosures designed for hazardous (classified) locations or enclosures to protect against environmental conditions. An enclosure within the scope of this exception, and all overcurrent protective device(s) within such enclosures as judged with the enclosure open, shall comply with the accessibility provisions of 240.24(A).

Revision - 240.24(E)

Not Located in Bathrooms

■ **What Changed:** Overcurrent protective devices (other than supplementary overcurrent devices) are no longer allowed in ANY bathroom or in showering facilities or locker rooms having showering facilities such area's present similar hazards as a bathroom.

■ **Its Effect:** The electrical industry will need to find other locations for overcurrent protective devices. This will likely have the largest effect on facilities or occupancies having limited square footage. Office buildings are common occupancies where panels were installed in bathrooms.

(E) Not Located in Bathrooms.
~~In dwelling units, dormitory units, and guest rooms or guest suites, overcurrent~~Overcurrent protective devices, other than supplementary overcurrent protection, shall not be located in bathrooms, showering facilities, or locker rooms with showering facilities.

New - 242.2

Reconditioned Equipment

■ **What Changed:** New Section 242.2 specifying that surge protective devices (SPDs) and surge arresters shall not be reconditioned.

■ **Its Effect:** This requirement will help ensure that when existing SPDs or surge arresters are being replaced, they're being replaced with new and listed equipment. This will add safety to the electrical system.

242.2 **Reconditioned Equipment.**
SPDs and surge arresters shall not be reconditioned.

New - 242.9

Indicating

■ **What Changed:** New Section 242.9 requires surge protective devices (SPDs) to have an indication that the device is functioning properly.
new Section 242.2

■ **Its Effect:** This change will add safety to electrical systems since malfunctioning SPDs can be better identified and, therefore, replaced.

242.9 Indicating.
An SPD shall provide indication that it is functioning properly.

New - Article 245

Overcurrent Protection for Systems Rated Over 1000 Volts ac, 1500 Volts dc

■ **What Changed:** Various portions of Articles 215, 225, 230, and 240 dealing with conductors or systems operating at over 1,000 volts were relocated to the new Article 245, Overcurrent Protection for Systems Rated Over 1000 Volts ac, 1500 Volts dc. The move was to help increase the usability of the NEC by having requirements for systems operating over 1,000 volts be located in their own articles
The move was to help increase the usability of the NEC by having requirements for systems operating over 1,000 volts be located in their own articles

■ **Its Effect:** These new articles will likely aid users of the NEC to more easily find requirements specifically for systems operating at over 1,000 volts.

Article 245 Overcurrent Protection for Systems Rated Over 1000 Volts ac, 1500 Volts dc
245.1 Scope.
This article covers overcurrent protection requirements for systems over 1000 volts ac, 1500 volts dc, nominal.

Reference NEC for complete Text

Revision - 250.24

Grounding of Service-Supplied Alternating-Current Systems

■ **What Changed:** Several changes made within Section 250.24 to meet the requirements of the NEC Style Manual.

■ **Its Effect:** There is not much of an impact with this change, but it adds clarity to the requirements described in this article when installing conductors connected in parallel. This will benefit electrical professionals when it comes to this type of installation.

250.24 Grounding of Service-Supplied Alternating-Current Systems.

Reference NEC for complete Text

Revision - 250.24(D)(2)

Grounding of Service-Supplied Alternating-Current Systems.
(D) Grounded Conductor Brought to Service Equipment.
(2) Conductors in Two or More Raceways or Cables Connected in Parallel.

■ **What Changed:** Section 250.4(D)(2) was revised for technical accuracy and easier use and understanding by electrical professionals by clarifying the requirements concerning grounded parallel conductors for service equipment. When parallel grounded service conductors in both raceways and cables are connected in parallel, the size of the grounded conductor should be based upon the size of the ungrounded conductor in the raceway or cable.

■ **Its Effect:** This change was a grammatical change making sure the NEC language was specific about the action taking place.

(2) Conductors Connected in Parallel in Two or More Raceways or Cables ~~Connected in Parallel~~.
If the ungrounded service-entrance conductors are connected in parallel in two or more raceways or cables, the grounded conductors shall also be installed in each raceway or cable and shall be connected in parallel. The size of ~~the~~each grounded conductor(s) in each raceway or cable shall not be smaller than 1/0 AWG and shall be sized in accordance with 250.24(D)(2)(a) or (D)(2)(b) in accordance with 250.24(D)(1). ~~be based on the largest ungrounded conductor in each raceway or cable, or the sum of the circular mil areas of the largest ungrounded conductors from each set connected in parallel in each raceway or cable in accordance with in 250.24(D)(1) , but not smaller than 1/0 AWG~~

Revision - 250.30(C)

Outdoor Source, Exception

■ **What Changed:** The word "neutral" was removed the from 250.30(C) to be consistent with other locations within the NEC and with language found at 250.36 and 250.187.
CMP-5 removed the

■ **Its Effect:** The creation of the new definition for Impedance Grounded System will be beneficial to the electrical professional. When consistency in terminology can be achieved, the Code becomes more user-friendly.

(C) Outdoor Source.
If the source of the separately derived system is located outside the building or structure supplied, a grounding electrode connection shall be made at the source location to one or more grounding electrodes in ~~compliance~~accordance with 250.50. In addition, the installation shall ~~comply~~be in accordance with 250.30(A) for grounded systems or with 250.30(B) for ungrounded systems.

Revision - 250.36

Impedance Grounded Systems — 480 Volts to 1000 Volts

■ **What Changed:** The words "High" and "Neutral" were removed from the title of Section 250.36, renaming the section to be Impedance Grounded Systems — 480 Volts to 1000 Volts. A new definition for "impedance grounding conductor" was also created.

■ **Its Effect:** The changes at 250.36 should not make a big impact on the electrical industry by making these changes. They make the text more accurate when it comes to "Impedance Bonding Jumpers," adding clarity and consistency to the NEC.

> **250.36** ~~High-~~Impedance Grounded~~ Neutral~~ Systems — 480 Volts to 1000 Volts. ~~High-impedance~~Impedance grounded ~~neutral~~ systems in which a grounding impedance~~, usually~~ device, typically a resistor, limits the ground-fault current ~~to a low value~~ shall be permitted for 3-phase ac systems of 480 volts to 1000 volts if all the following conditions are met:
>
> Reference NEC for complete Text

Revision - 250.50

Grounding Electrode System, 250.52(A)(3)(1) Concrete- Encased Electrode, 250.52(B)(3) Not Permitted for Use as Grounding Electrodes.

■ **What Changed:** The term "reinforcing steel or rods" was replaced with "rebar." This revision was done in all three sections of the Code for consistency.

■ **Its Effect:** This new term allows the electrical professionals and the electrical industry to be consistent when utilizing the word "Rebar" with grounding electrode systems, concrete-encased electrodes, and grounding electrodes.

250.50 Grounding Electrode System.
All grounding electrodes as described in 250.52(A)(1) through (A)(7) that are present at each building or structure served shall be bonded together to form the grounding electrode system. ~~Where~~If none of these grounding electrodes exist, one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(8) shall be installed and used.
Exception: Concrete-encased electrodes of existing buildings or structures shall not be required to be part of the grounding electrode system ~~where~~if the steel reinforcing bars or rods are not accessible for use without disturbing the concrete.

(3) Concrete-Encased Electrode.
A concrete-encased electrode shall consist of at least 6.0 m (20 ft) of either ~~(1) or (2)~~of the following:

1. One or more bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm (**1⁄2** in.) in diameter, installed in one continuous 6.0 m (20 ft) length, or if in multiple pieces connected together by ~~the usual~~ steel tie wires, exothermic welding, welding, or other effective means to create a 6.0 m (20 ft) or greater length~~; or~~

(B) 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~~rebar described in 680.26(B)(1) and (B)(2)

New - 250.64(G)

Enclosures with Ventilation Openings

■ **What Changed:** New requirement added to prohibit openings in enclosures intended for ventilation to be used to install the grounding electrode conductor.
The ventilation openings in equipment enclosures are provided to ensure that adequate cooling air is provided for the safe operation of the equipment under normal and abnormal conditions. Using one or more of these openings to install conductors, such as a grounding electrode conductor, can create a blockage to having adequate ventilation and therefore is now prohibited.

■ **Its Effect:** Electrical professionals will need to be on the lookout for proper installation of the grounding electrode conductor through an enclosure wall opening that is intended for ventilation. This could be a conduit opening when the conduit is installed, or it could be an opening in the enclosure provided for a bare grounding electrode conductor such as found on some panelboard cabinets.

(G) Enclosures with Ventilation Openings.
Grounding electrode conductors shall not be installed through a ventilation opening of an enclosure.

Relocation / Revision - 250.70

Methods of Grounding and Bonding Conductor Connection to Electrodes

■ **What Changed:** The section has been divided into new subsections (A) and (B), and the list of methods for connection to grounding electrodes has been eliminated. The list item for the communications system has been moved to the new list item (B) as a permitted method. A new informational note was added to clarify to users that a connector or fitting that is listed as suitable for direct burial is also listed and suitable for concrete encasement.

■ **Its Effect:** The reorganization should give some clarity to electrical professionals and eliminate some connection means that are not available to be used. The informational note will address concerns that have been raised by installers or inspectors concerning these types of grounding connections.

250.70 Methods of Grounding and Bonding Conductor Connection to Electrodes.

(A) General.

The grounding or bonding conductor shall be connected to the grounding electrode by exothermic welding, listed lugs, listed pressure connectors, listed clamps, or other listed means. Connections depending on solder shall not be used. Ground clamps shall be listed for the materials of the grounding electrode and the grounding electrode conductor and, ~~where~~if used on pipe, rod, or other buried electrodes, shall also be listed for direct soil burial or concrete encasement. Not more than one conductor shall be connected to the grounding electrode by a single clamp or fitting unless the clamp or fitting is listed for multiple conductors. ~~One of the following methods shall be used:~~

1. ~~A pipe fitting, pipe plug, or other approved device screwed into a pipe or pipe fitting~~
2. ~~A listed bolted clamp of cast bronze or brass, or plain or malleable iron~~
3. ~~For indoor communications purposes only, a listed sheet metal strap-type ground clamp having a rigid metal base that seats on the electrode and having a strap of such material and dimensions that it is not likely to stretch during or after installation~~
4. ~~An equally substantial approved means~~

(B) Indoor Communications Systems.

For indoor communications purposes only, a listed sheet metal strap-type ground clamp having a rigid metal base that seats on the electrode and having a strap of such material and dimensions that it is not likely to stretch during or after installation shall be permitted.

Informational Note: Listed ground clamps that are identified for direct burial are also suitable for concrete encasement.

Revision - 250.94(A)

The Intersystem Bonding Termination Device

■ **What Changed:** Minor wording changes in 250.94(A)(4) a and b and Informational Note 1, was removed, which did not have much value within the code and did not comply with the NEC Style Manual.
■ Why it happened: Section 250.94(A) gives requirements for installing the Intersystem

■ **Its Effect:** Updated language at 250.94(A)(4) a and b helps to clarify this section for the electrical professional. Informational Note 1 was removed for useability as it was determined that it did not add value to the Code.

(A) The Intersystem Bonding Termination Device.

An intersystem bonding termination (IBT) for connecting intersystem bonding conductors 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 that are supplied by a feeder or branch circuit. If an IBT is used, it shall comply with the following:

1. Be accessible for connection and inspection~~.~~
2. Consist of a set of terminals with the capacity for connection of not less than three intersystem bonding conductors~~.~~
3. Not interfere with opening the enclosure for a service, building or structure disconnecting means, or metering equipment~~.~~
4. Be securely mounted as follows:
    1. At the service equipment, ~~be~~to ~~securely mounted and electrically connected to an~~a metal enclosure for the service equipment, to ~~the~~a metal meter enclosure, for an exposed nonflexible ~~metallic~~metal service raceway, or be ~~mounted at one of these enclosures and be~~ connected to the metal enclosure or to the grounding electrode conductor with a minimum 6 AWG copper conductor~~.~~
    2. At the disconnecting means for a building or structure that is supplied by a feeder or branch circuit, be ~~securely mounted and~~ electrically connected to the ~~metallic~~metal enclosure for the building or structure disconnecting means, or ~~be mounted at the disconnecting means and~~ be connected to the ~~metallic~~metal enclosure for the grounding electrode conductor with a minimum 6 AWG copper conductor~~.~~
5. ~~The terminals shall be~~Be listed as grounding and bonding equipment~~.~~

Exception: In existing buildings or structures ~~where~~, if any of the intersystem bonding and grounding electrode conductors required by 770.100(B)(2), 800.100(B)(2), 810.21(F)(2), and 820.100~~, and 830.100~~ exist, installation of ~~the intersystem bonding termination is~~an IBT shall not be required. An accessible means external to enclosures for connecting intersystem bonding and grounding electrode conductors shall be permitted at the service equipment and at the disconnecting means for any ~~additional~~ buildings or structures that are supplied by a feeder or branch circuit by at least one of the following means:

1. *Exposed nonflexible ~~metallic~~metal raceways*
2. *An exposed grounding electrode conductor*
3. *Approved means for the external connection of a copper or other*

Revision - 250.106

Lightning Protection Systems

■ **What Changed:** References to the NFPA 780 standard were removed for Informational Note No. 1 and updated for Informational Note No. 2.

■ **Its Effect:** This change will help the electrical professional and electrical industry understand this section better. It is also to be understood by the Code user that when a standard is referenced, it is to be considered the most up-to-date version
unless a date for the publication has been included

250.106 Lightning Protection Systems.
The lightning protection system ground terminals shall be bonded to the building or structure grounding electrode system.
Informational Note No. 1: See 250.60 for use of strike termination devices. ~~For further information, see NFPA 780-2020, *Standard for the Installation of Lightning Protection Systems*, which contains detailed information on grounding, bonding, and sideflash distance from lightning protection systems.~~
Informational Note No. 2: ~~For further information, see~~See NFPA 780~~-2020~~, *Standard for the Installation of Lightning Protection Systems*, which contains detailed information on grounding, bonding, and sideflash distance from lightning protection systems.
~~Informational Note No. 2: Metal raceways, enclosures, frames, and other non-current-carrying metal parts of electrical equipment installed on a building equipped with a lightning protection system may require bonding or spacing from the lightning protection conductors in accordance with NFPA 780-2020, *Standard for the Installation of Lightning Protection Systems*.~~

New - 250.118(A)

Types of Equipment Grounding Conductors, (A) Permitted.

■ **What Changed:** A new Item (6)(f), for stainless-steel flexible and liquid tight metal conduit, has been included as an acceptable wiring method for locations where high resistance to corrosion is encountered.. The stainless-steel core provides higher resistivity than other metal types used with flexible conduits. A separate internal EGC or external bonding jumper is required to be installed to provide an effective ground-fault current path.

■ **Its Effect:** The electrical professional now has additional options for use where high resistance to corrosion is required. The AHJ and installer will need to ensure that the required EGC or bonding jumper is used if this method of raceway is utilized.

(f) If liquidtight flexible metal conduit contains a stainless steel core, a wire-type equipment grounding conductor or a bonding jumper in accordance with 250.102(E)(2) shall be installed.

Revision - 250.130

Equipment Grounding Conductor Connections

■ **What Changed:** Snap switches added to the items that must conform with requirements found at 250.130(C) for their equipment grounding conductor connection.

■ **Its Effect:** Section 250.130 will now provide the electrical professionals with coordination with Article 406 regarding the replacement of non-grounding type receptacles and non-grounding type snap switches. This revision brings usability and clarity to the user of the Code.

(C) Replacement of Nongrounding Receptacle ~~Replacement~~ or Snap Switch and Branch Circuit Extensions.

The equipment grounding conductor ~~of~~that is connected to a grounding-type receptacle, a snap switch with an equipment grounding terminal, or a branch-circuit extension shall be permitted to be connected to any of the following:

1. Any accessible point on the grounding electrode system as described in 250.50
2. Any accessible point on the grounding electrode conductor
3. The equipment grounding terminal bar within the enclosure where the branch circuit for the receptacle or branch circuit originates
4. An equipment grounding conductor that is part of another branch circuit that originates from the enclosure where the branch circuit for the receptacle or branch circuit originates
5. For grounded systems, the grounded service conductor within the service equipment enclosure
6. For ungrounded systems, the grounding terminal bar within the service equipment enclosure

Informational Note No. 1: See 406.4(D) for the use of a ground-fault circuit-interrupting type of receptacle.

Informational Note No. 2: See 404.9(B) for requirements regarding grounding of snap switches.

Revision - 250.140

Frames of Ranges and Clothes Dryers

■ **What Changed:** Section 250.140 revised for clarity by changing the main requirement and the former exception into two titled subdivisions.

■ **Its Effect:** The changes in Section 250.140 clarify requirements for electrical professionals of these types of installations regarding ranges and dryers. The only big change is that the grounded connector is to be insulated or field covered within the supply enclosure with a listed insulating material. This will prevent contact with an uninsulated conductor with any normally non-current carrying metal part of the equipment.

250.140 Frames of Ranges and Clothes Dryers.

Frames of electric ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers, and outlet or junction boxes that are part of the circuit ~~for these appliances~~ shall be connected to the equipment grounding conductor in ~~the manner specified by 250.134 or 250.138~~accordance with 250.140(A) or the grounded conductor in accordance with 250.140(B).

~~*Exception: For existing branch-circuit installations only if an equipment grounding conductor is not present in the outlet or junction box, the frames of electric ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers, and outlet or junction boxes that are part of the circuit for these appliances shall be permitted to be connected to the grounded circuit conductor if all the following conditions are met.*~~

(A) Equipment Grounding Conductor Connections.

The circuit supplying the appliance shall include an equipment grounding conductor. The frame of the appliance shall be connected to the equipment grounding conductor in the manner specified by 250.134 or 250.138.

(B) Grounded Conductor Connections.

For existing branch-circuit installations only, if an equipment grounding conductor is not present in the outlet or junction box the frame of the appliance shall be permitted to be connected to the grounded conductor if all the conditions in the following list items (1), (2), and (3) are met and the grounded conductor complies with either list item (4) or (5):

1. The supply circuit is 120/240-volt, single-phase, 3-wire; or 208Y/120-volt derived from a 3-phase, 4-wire, wye-connected system.
2. The grounded conductor is not smaller than 10 AWG copper or 8 AWG aluminum or copper-clad aluminum.
3. Grounding contacts of receptacles furnished as part of the equipment are bonded to the equipment.
4. The grounded conductor is insulated, or the grounded conductor is uninsulated and part of a Type SE service-entrance cable and the branch circuit originates at the service equipment.
5. The grounded conductor is part of a Type SE service-entrance cable that originates in equipment other than a service. The grounded conductor shall be insulated or field covered within the supply enclosure with listed insulating material, such as tape or sleeving to prevent contact of the uninsulated conductor with any normally non-current-carrying metal parts.

Revision - 250.148

Continuity of Equipment Grounding Conductors and Attachment in Boxes

■ **What Changed:** Subdivision (A) modified to specify that all equipment grounding conductors that are spliced or terminated within a box are required to be connected together without regard to if they are for different circuits. Also, the reference for the connection means complying with 250.8 was relocated to this section.

■ **Its Effect:** Electrical professionals will need to be aware of the requirements for connecting all the equipment grounding conductors together rather than just those associated with its circuit. This is a requirement that has been reversed several times over the past few cycles and is confusing depending on which edition of the code is adopted. Also, they will need to ensure that a properly sized bonding connection is made to the metal box where many times this has just been a 12 AWG copper pigtail.

250.148 Continuity of Equipment Grounding Conductors and Attachment in Boxes.
If circuit conductors are spliced within a box or terminated on equipment within or supported by a box, ~~all wire-type equipment grounding conductor(s) associated with any of those circuit conductors shall be connected within the box or to the box in accordance~~the installation shall comply with ~~250.8 and~~ 250.148(A) through (D).

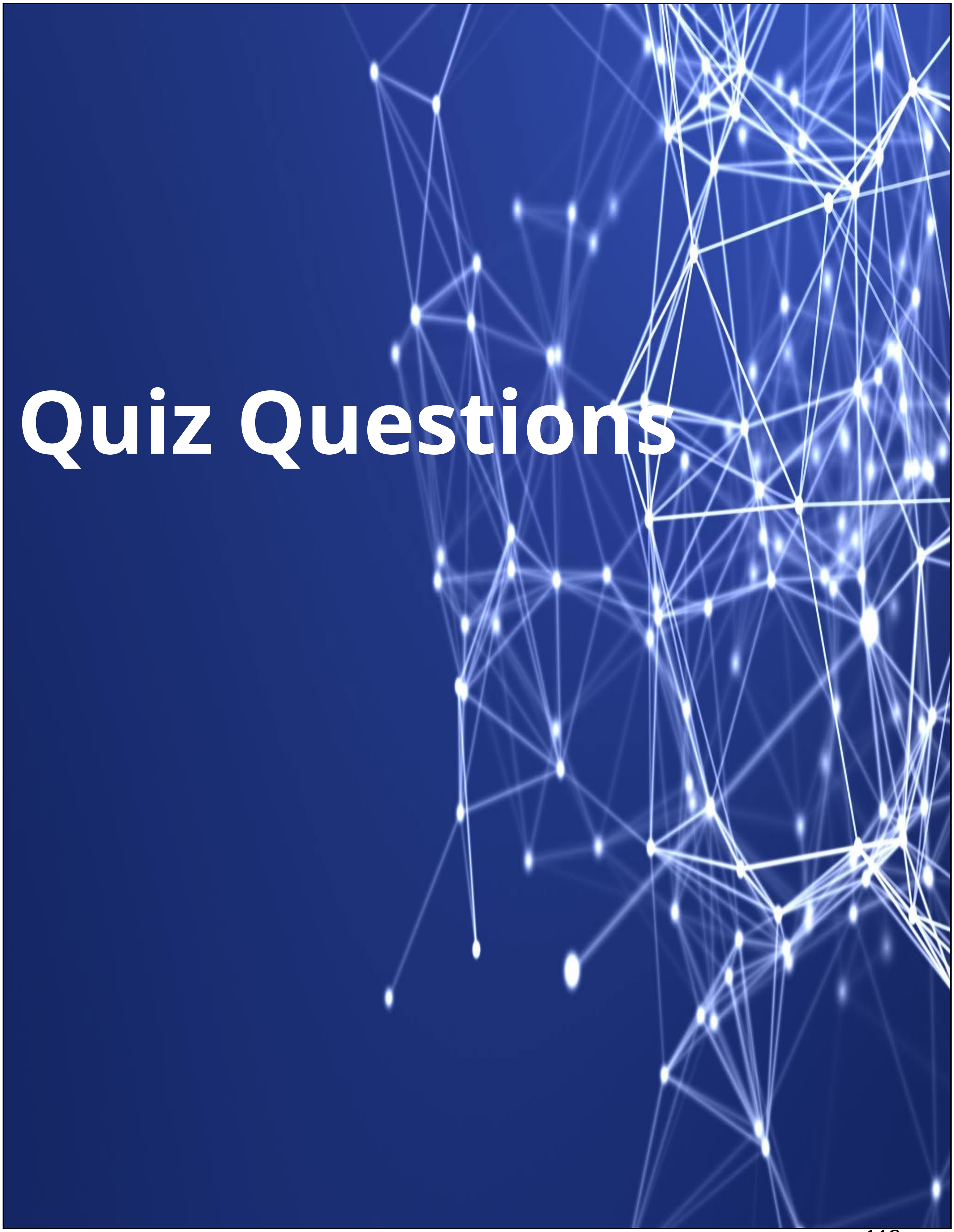
Exception: The equipment grounding conductor permitted in 250.146(D) shall not be required to be connected to the other equipment grounding conductors or to the box.

(A) Connections and Splices.
All equipment grounding conductors that are spliced or terminated within the box shall be connected together. Connections and splices shall be made in accordance with 110.14(B)and 250.8 except that insulation shall not be required.

(B) Equipment Grounding Conductor Continuity.
The arrangement of grounding connections shall be such that the disconnection or the removal of a luminaire, receptacle, or other device fed from the box does not interrupt the electrical continuity of the equipment grounding conductor(s) providing an effective ground-fault current path.

(C) Metal Boxes.
A connection used for no other purpose shall be made between the metal box and the equipment grounding conductor(s). ~~in accordance with 250.8~~ The equipment bonding jumper or equipment grounding conductor shall be sized from Table 250.122 based on the largest overcurrent device protecting circuit conductors in the box.

(D) Nonmetallic Boxes.
One or more equipment grounding conductors brought into a nonmetallic outlet box shall be arranged ~~such that~~to provide a connection ~~can be made~~ to any fitting or device in that box requiring connection to an equipment grounding conductor.


Quiz Questions

1. **Why were acronyms removed from all the definitions?**
   - To make it much easier to search terms in electronic searches
   - To ensure all definitions are understood correctly at first glance
   - Acronyms were moved to a specific acronym section
   - None of the above

2. **What is the difference between a worksurface and a countertop?**
   - The area of the size
   - The location of the surface in respect to the purposed room
   - The quantity of spillage that the surfaces may be subjected to
   - There is no difference between the two

3. **Which new definition includes three informational notes which identify particle size and types?**
   - Fibers/Flying, Combustible
   - Impedance Grounding Conductor
   - In Sight From
   - Class 4 Circuit

4. **Equipment is considered to be in sight from other equipment when it's visible and not more than how many feet from the other equipment?**
   - 15 ft
   - 25 ft
   - 50 ft
   - 200 ft

5. **Which of the following are new definitions in the 2023 NEC?**
   - Servicing
   - Short Circuit
   - Restricted Industrial Establishment
   - All of the above

6. **In regard to 110.3(B) Examination, Identification, Installation, Use, and Listing (Product Certification) of Equipment. (B) Installation and Use, there is a new informational note allowing the use of what to access installation instructions.**
   - Online NEC passcode
   - Enclosed instructions
   - Dashboard
   - QR code

7. **Arc Flash Warning is now required on Service Equipment and Feeder Supplied Equipment of rating?**
   - 1200 amperes or more
   - 1000 amperes or more
   - 1000 amperes or less
   - All equipment regardless of rating

8. **In regard to reconditioned equipment which of the following is correct?**
   - Equipment nameplate replaced
   - Equipment nameplate replaced and original listing made permanently illegible
   - Equipment nameplate remains with original listing made permanently illegible
   - Equipment nameplate remains but is made permanently illegible

9. **Is GFCI protection now required for all 125-volt through 250-volt receptacles within the kitchen?**
   - Yes
   - Yes, but at only at locations serving the countertop
   - Yes, with the exception of cord-and plug equipment
   - No

10. **In reference to 210.8(B)(7), how far from the top inside edge of a sink can a fixed or stationary appliance be to require GFCI protection?**
    - 4 ft
    - 6 ft
    - 8 ft
    - Always required

11. **The outdoor outlet serving old equipment now requires what when the old equipment is replaced?**
    - Outdoor enclosure
    - AFCI protection
    - GFCI protection
    - Nothing

12. **In reference to 210.19 Conductors – Minimum Ampacity and Size, the voltage limitation should apply to the __________, not the __________rating.**
    - conductor insulation, circuit
    - circuit, conductor insulation
    - conductor insulation, voltage
    - ohms, voltage

13. **Which of the following can a 10-ampere branch circuit supply loads for?**
    - Lighting outlets
    - Receptacle outlets
    - Garage door openers
    - Fixed appliances

14. **Why will this new requirement increase the calculated load for dwelling units, buildings, and other spaces that depend on square foot calculations when determining the load?**
    - Garages, or unused or unfinished space(s) are no longer excluded from the calculated floor area of the building, dwelling unit, or other areas
    - Future Photovoltaic requirements will be required and accounted for
    - Electric vehicle charging stations are now mandated for load assessments
    - All of the above

15. **Electric Vehicle Supply Equipment (EVSE) has now been specified for load calculations, what is the minimum volt-ampere requirement?**
    - 7200
    - 1100
    - 890
    - 400

16. **Which of the following now require surge protection?**
    - Dwelling units
    - Dormitory units
    - Guest rooms
    - Patient sleeping rooms
    - All of the above

17. **What new rating was added to the list of standard ratings of overcurrent protection devices?**
    - 75 amperes
    - 50 amperes
    - 20 amperes
    - 10 amperes

18. **Overcurrent protective devices (other than supplementary overcurrent devices) are no longer allowed in?**
    - Bathrooms
    - Utility closets
    - Entry areas
    - Emergency exits

19. **Regarding Enclosures with Ventilation Openings, under what scenario may a ventilation opening be used for the grounding electrode conductors?**
    - In instances when no other access if feasible
    - Anytime, not prohibited
    - Never, is prohibited
    - Not specified

20. **All equipment grounding conductors that are spliced or terminated within a box are required to be connected together without regard to if they are for different circuits?**
    - No
    - Yes
    - Only when cable types are identical
    - Only if bonding jumper for metal box is missing