Revisions for the 2020 National Electrical Code - Part 1

An Online Continuing Education Course for Engineers

Course Number: E-4063

Credit: 4 Hours / 4 PDH / 4 CPD

Revisions for the 2020 National Electrical Code - Part 1

Patrick Ouillette, P.E.

This course is intended to familiarize the reader with the major changes contained in the 2020 National Electrical Code®. These are the "need to know" changes. The document is heavily illustrated to enable effective and efficient visual learning. The course addresses Code revisions that apply to all types of occupancies: residential, commercial, and industrial.

The course is divided into 3 parts:

- Part 1: Code-wide changes through Article 220
- Part 2: Article 230 through Article 406
- Part 3: Article 408 through Article 800

The layout and method of this presentation will enable new Code users to easily navigate through the changes. Those well experienced in the Code will find depth in the coverage. Through the heading(s) at the beginning of each Code change addressed in the document, the reader will readily identify the section affected by the change and the specific subject being discussed.

The Introduction sets the stage. An Analysis of the Code change follows, with explanations where necessary to help the student understand the revision, its background, and the logic of the change. Graphics, photographs, examples, or calculations are used to illustrate the change and to enhance learning. The Summary is a brief re-statement of the highlights of the Code change.

An Application Question with an answer is included at the end of most Code sections studied for exercise in applying the change. The "Top Ten" most significant Code changes, in the author's opinion, are identified. Less significant changes are addressed in less detail. Some of the sections analyzed contain a Code Refresher that addresses existing Code requirements related to the change. General Code information and rules are weaved into the writing throughout the document. The author's writing method attempts to provide general Code study and a Code refresher through discussion of the Code changes. NFPA 70E®, Electrical Safety in the Workplace, is briefly discussed and referenced several times within the course.

Although there are many references to the 2020 NEC® throughout this document, the course and quiz can be completed without the need to refer to the NEC® itself. However, the learning experience will be enhanced by referring to the NEC® as the course is completed. For further study on any Code section within this course, the full text of the 2020 NEC® should be consulted.

You can read the 2020 NEC® online at the following site, courtesy of NFPA:

https://www.nfpa.org/NEC/electrical-codes-and-standards/NFPA-70?code=70

Code-Wide Changes

Four New Articles

Four new articles are included in the 2020 *NEC*. They are summarized here and discussed in detail in this course.

Article 242 — Overvoltage Protection

Existing Article 280 — Surge Arresters, Over 1000 Volts, and Article 285 — Surge-Protective Devices (SPDs), 1000 Volts or Less, have been combined into new Article 242 — Overvoltage Protection.

Article 242 provides the general requirements, installation requirements, and connection requirements for overvoltage protection and overvoltage protective devices. It covers surge-protective devices (SPDs) permanently installed on premises wiring systems of not more than 1,000 volts, and surge arresters that are permanently installed on premises wiring systems of over 1,000 volts.

Article 311 — Medium Voltage Conductors and Cable

Article 311 covers the use, installation, construction specifications, and ampacities for Type MV medium voltage conductors and cable.

Most medium voltage requirements have been relocated to new Article 311. Requirements applicable to medium voltage conductors were deleted from Article 310 and placed in Article 311. Former Article 328 — Medium Voltage Cable: Type MV, has been deleted and its contents inserted in Article 311. The Institute of Electrical and Electronics Engineers (IEEE) defines medium voltage as greater than 1000 volts and up to 72 kV. In the *NEC*, medium-voltage cable (Type MV) is insulated cable rated 2001 volts up to and including 35,000 volts, nominal (311.2).

Article 337 — Type P Cable

The article covers the use, installation, and construction specifications for armored and unarmored Type P cable rated through 2000 volts. This cable type was added to the *NEC* primarily to address the need for a suitable cable for land-based drilling rigs, including related hazardous locations.

Article 800 — General Requirements for Communications Systems

Article 800 covers general requirements for communications systems. These general requirements apply to communications circuits, community antenna television and radio distribution systems, network-powered broadband communications systems, and premises-powered broadband communications systems.

New Article 800 combines common requirements from most Chapter 8 articles to reduce redundancy. It uses an existing article number, but with completely new rules. Former Article 800 — Communications Circuits has been re-numbered Article 805 — Communications Circuits.

Available Fault Current

Several terms have been used in the many editions of the *NEC* to describe the large amount of current that is capable of flowing during a short-circuit condition. Terms such as "available short-circuit current," "short-circuit current," and "maximum available fault current" have been used to describe this large current flow during fault conditions. In the 2020 Code, the term "available fault current" has replaced these similar previously used terms. A new definition for *fault current, available* has been added in Article 100, along with explanatory information.

Reconditioned Equipment

Marking of reconditioned equipment was introduced in the 2017 *NEC* [110.21(A)(2)]. This marking provides guidance to the AHJ when considering the approval of reconditioned equipment and provides information to purchasers about the condition of a product. The *NEC* requires that the equipment's original listing mark be removed. Approval of reconditioned equipment cannot be based solely on the equipment's original listing.

Reconditioned equipment shall be marked with the name, trademark, or other descriptive marking by which the organization responsible for reconditioning the equipment can be identified, along with the date of the reconditioning. Reconditioned equipment shall be identified as "reconditioned." In industrial occupancies, equipment that is reconditioned as part of a regular equipment maintenance program does not need to be marked as reconditioned.

Several articles in the 2020 *NEC* contain rules for reconditioned equipment. Examples of equipment not permitted to be reconditioned include AFCI and GFCI devices, receptacles, molded-case circuit breakers, panelboards, luminaires, fire pump controllers, and automatic transfer switches for emergency systems and legally required standby systems. Equipment permitted to be reconditioned includes low- and medium-voltage power circuit breakers, high-voltage circuit breakers, switchboards, and switchgear.

The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured*.

Location and Application of Definitions

Generally, definitions for terms that are used in more than one Code article are placed in Article 100 — Definitions. Definitions are also located in the .2 section of certain articles. In the 2020 Code, where an article contains definitions, the .2 section will include a statement as to the applicability of the definition. In some cases, a definition is applicable only within that specific article. Other times a definition may be applicable throughout the *NEC*.

For example, in Article 352 — Rigid Polyvinyl Chloride Conduit: Type PVC, a new statement before the definition of PVC tells the Code user that the definition shall apply within Article 352 and throughout the Code. The term *PVC* is used in many places in the *NEC*, but is appropriately located in Article 352, since usage requirements, construction specifications, etc. are located in the same article.

Some definitions are applicable only within the article where the term is defined. For example, the definitions in 240.2 are applicable only within Article 240.

There are definitions in Article 550 that are applicable both to Article 550 and throughout the Code.

Application Question 1

The definition of the term *branch-circuit selection current* used in Article 440 is _____. (Write your answers on another sheet of paper. Answers on the last page.)

a. Applicable throughout the Code
b. Applicable only within Article 440
c. Applicable within Article 440 and throughout the Code
d. Located in Article 100

Modifying or Supplementing the GFCI Requirements in 210.8

Since the GFCI requirements in 210.8 are not limited to dwellings, this section can be used as a general requirement modified or supplemented by requirements in Chapters 5 through 7. Recall that Chapters 1 through 4 of the Code apply generally and may be supplemented or modified in Chapters 5 through 7. Instead of repeating the GFCI requirements in 210.8, these general rules can be referenced and modified as necessary. For example, new section 545.28 contains requirements for GFCI protection in relocatable structures. The rule states that "in addition to the requirements of 210.8(B)," all receptacle outlets installed in compartments accessible from outside the relocatable structure shall have GFCI protection for personnel. Other sections in the 2020 Code also supplement the GFCI requirements in 210.8 using the phrase *in addition to the requirements in 210.8….*

Allowable Ampacity ⟶ Ampacity

Article 100 defines *ampacity* as the maximum current that a conductor can carry continuously under the conditions of use without exceeding its temperature rating. Some sections in the Code used the term *allowable ampacity*, which does not add clarity. The conditions of use are to be considered in sections throughout the *NEC* where conductor ampacity is specified. The 2020 *NEC* deletes *allowable* in several locations and uses the term *ampacity*.

Grounding Conductor ⟶ Equipment Grounding Conductor

Electrical apprentices are taught the definitions and correct use of the many terms related to grounding and bonding like *ground*, *grounded*, *equipment grounding conductor*, *grounding electrode conductor*, etc. However, the *NEC* has used an unfamiliar term, *grounding conductor*, which has sometimes been misapplied. *Grounding conductor* was defined in Article 100 until the 2011 *NEC*. The term has been replaced in the new Code with the appropriate term. Many revisions have been made to provide clarity and consistency in the use of electrical terminology.

Application Question 2

The bare conductor in a typical 12/2 Type NM cable is nearly always connected/used as a(n) _____ conductor.

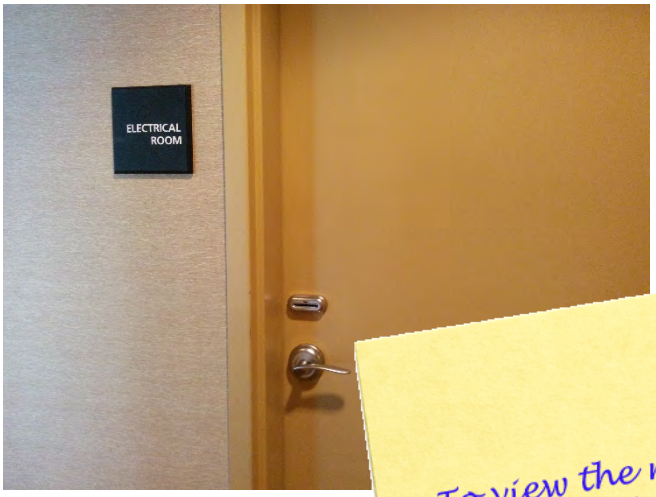
a. Ground
b. Grounded
c. Grounding
d. Equipment grounding

Article 100 Definitions

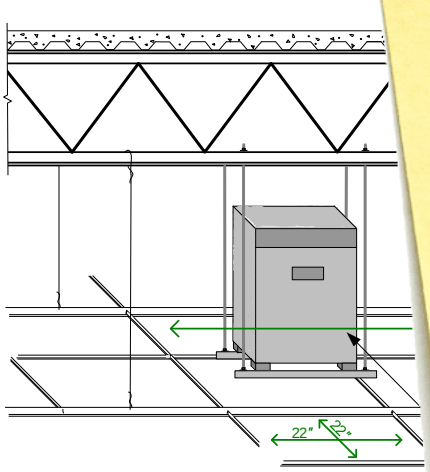
Accessible (as applied to equipment) [revised definition]
In the 2020 Code, *accessible equipment* is equipment that is capable of being reached for operation, renewal, and inspection.

This is a significant revision from the previous definition. Formerly, equipment was *accessible* if it admitted a close approach and was not guarded by locked doors, elevation, or other effective means. This was in conflict with 110.26(F), which states that electrical equipment rooms or enclosures housing electrical apparatus that are controlled by a lock(s) are considered *accessible* to qualified persons. Locking electrical equipment doors is a common practice in supervised facilities.

Exhibit 100.1 in NFPA's *NEC* Handbook describes conditions where equipment is more than 6'-7" above the floor but deemed accessible. Sections 240.24, 368.17(C), and 404.8(A) are examples of rules where elevation does not preclude access to equipment. Also, 110.26(A)(4), Limited Access, permits equipment that is likely to require examination or servicing to be located above suspended ceilings, where the installation complies with requirements in that subsection.



Accessible electrical equipment
behind locked



cal equipment
above suspended ceiling