



Mike Holt's Illustrated Guide to

In partnership with



SUMMARY OF THE CHANGES TO THE NATIONAL ELECTRICAL CODE®



BASED ON THE
2023
NEC®

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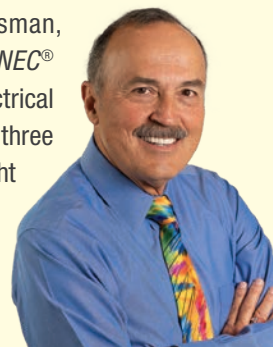
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ABOUT THE AUTHOR

Mike Holt is an author, businessman, educator, speaker, publisher and *NEC*® expert. He's written hundreds of electrical training books and articles, founded three successful businesses, and has taught thousands of electrical *Code* seminars across the U.S. and internationally. His dynamic presentation style, deep understanding of the trade, and ability to connect with students are some of the reasons that he is one of the most sought-after speakers in the industry.



Mike is committed to changing lives and helping people take their careers to the next level. He has always felt a responsibility to provide education beyond the scope of just passing an exam. He draws on his previous experience as an electrician, inspector, contractor and instructor, to guide him in developing powerful training solutions that electricians understand and enjoy. He's mastered the art of simplifying and clarifying complicated technical concepts and his extensive use of illustrations helps students apply the content and relate the material to their work in the field.

Mike's commitment to pushing boundaries and setting high standards extends into his personal life as well. He's an eight-time Overall National Barefoot Waterski Champion. Mike has more than 20 gold medals, many national records, and has competed in three World Barefoot Tournaments. In 2015, at the tender age of 64, he started a new adventure—competitive mountain bike racing. Every day he continues to find ways to motivate himself, both mentally and physically.

Mike and his wife, Linda, reside in New Mexico and Florida, and are the parents of seven children and seven grandchildren. As his life has changed over the years, a few things have remained constant: his commitment to God, his love for his family, and doing what he can to change the lives of others through his products and seminars.

*I dedicate this book to the
Lord Jesus Christ,
my mentor and teacher.
Proverbs 16:3*



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HOW TO USE THE *NATIONAL ELECTRICAL CODE*

The original *NEC* document was developed in 1897 as a result of the united efforts of various insurance, electrical, architectural, and other cooperative interests. The National Fire Protection Association (NFPA) has sponsored the *National Electrical Code* since 1911.

The purpose of the *Code* is the practical safeguarding of persons and property from hazards arising from the use of electricity. It isn't intended as a design specification or an instruction manual for untrained persons. It is, in fact, a standard that contains the minimum requirements for an electrical installation that's essentially free from hazard. Learning to understand and use the *Code* is critical to you working safely; whether you're training to become an electrician, or are already an electrician, electrical contractor, inspector, engineer, designer, or instructor.

The *NEC* was written for qualified persons; those who understand electrical terms, theory, safety procedures, and electrical trade practices. Learning to use the *Code* is a lengthy process and can be frustrating if you don't approach it the right way. First, you'll need to understand electrical theory and if you don't have theory as a background when you get into the *NEC*, you're going to struggle. Take one step back if necessary and learn electrical theory. You must also understand the concepts and terms in the *Code* and know grammar and punctuation in order to understand the complex structure of the rules and their intended purpose(s). The *NEC* is written in a formal outline which many of us haven't seen or used since high school or college so it's important for you to pay particular attention to this format. Our goal for the next few pages is to give you some guidelines and suggestions on using your *Code* book to help you understand that standard, and assist you in what you're trying to accomplish and, ultimately, your personal success as an electrical professional!

Language Considerations for the *NEC*

Terms and Concepts

The *NEC* contains many technical terms, and it's crucial for *Code* users to understand their meanings and applications. If you don't understand a term used in a rule, it will be impossible to properly apply the *NEC* requirement. Article 100 defines those that are used generally in two or more articles throughout the *Code*; for example, the term "Dwelling Unit" is found in many articles. If you don't know the *NEC* definition for a "dwelling unit" you can't properly identify its *Code* requirements. Another example worth mentioning is the term "Outlet." For many people it has always meant a receptacle—not so in the *NEC*!

Article 100 contains the definitions of terms used throughout the *Code*. Where a definition is unique to a specific article, the article number is indicated at the end of the definition in parenthesis (xxx). For example, the definition of "Pool" is specific to Article 680 and ends with (680) because it applies ONLY to that article. Definitions of standard terms,

such as volt, voltage drop, ampere, impedance, and resistance are not contained in Article 100. If the *NEC* does not define a term, then a dictionary or building code acceptable to the authority having jurisdiction should be consulted.

Small Words, Grammar, and Punctuation

Technical words aren't the only ones that require close attention. Even simple words can make a big difference to the application of a rule. Is there a comma? Does it use "or," "and," "other than," "greater than," or "smaller than"? The word "or" can imply alternate choices for wiring methods. A word like "or" gives us choices while the word "and" can mean an additional requirement must be met.

An example of the important role small words play in the *NEC* is found in 110.26(C)(2), where it says equipment containing overcurrent, switching, "or" control devices that are 1,200A or more "and" over 6 ft wide require a means of egress at each end of the working space. In this section, the word "or" clarifies that equipment containing any of

the three types of devices listed must follow this rule. The word “and” clarifies that 110.26(C)(2) only applies if the equipment is both 1,200A or more and over 6 ft wide.

Grammar and punctuation play an important role in establishing the meaning of a rule. The location of a comma can dramatically change the requirement of a rule such as in 250.28(A), where it says a main bonding jumper shall be a wire, bus, screw, or similar suitable conductor. If the comma between “bus” and “screw” was removed, only a “bus screw” could be used. That comma makes a big change in the requirements of the rule.

Slang Terms or Technical Jargon

Trade-related professionals in different areas of the country often use local “slang” terms that aren’t shared by all. This can make it difficult to communicate if it isn’t clear what the meaning of those slang terms are. Use the proper terms by finding out what their definitions and applications are before you use them. For example, the term “pigtail” is often used to describe the short piece of conductor used to connect a device to a splice, but a “pigtail” is also used for a rubberized light socket with pre-terminated conductors. Although the term is the same, the meaning is very different and could cause confusion. The words “splice” and “tap” are examples of terms often interchanged in the field but are two entirely different things! The uniformity and consistency of the terminology used in the *Code*, makes it so everyone says and means the same thing regardless of geographical location.

NEC Style and Layout

It’s important to understand the structure and writing style of the *Code* if you want to use it effectively. The *National Electrical Code* is organized using twelve major components.

1. Table of Contents
2. Chapters—Chapters 1 through 9 (major categories)
3. Articles—Chapter subdivisions that cover specific subjects
4. Parts—Divisions used to organize article subject matter
5. Sections—Divisions used to further organize article subject matter
6. Tables and Figures—Represent the mandatory requirements of a rule
7. Exceptions—Alternatives to the main *Code* rule
8. Informational Notes—Explanatory material for a specific rule (not a requirement)
9. Tables—Applicable as referenced in the *NEC*
10. Annexes—Additional explanatory information such as tables and references (not a requirement)

11. Index
12. Changes to the *Code* from the previous edition

1. Table of Contents. The Table of Contents displays the layout of the chapters, articles, and parts as well as the page numbers. It’s an excellent resource and should be referred to periodically to observe the interrelationship of the various *NEC* components. When attempting to locate the rules for a specific situation, knowledgeable *Code* users often go first to the Table of Contents to quickly find the specific *NEC* rule that applies.

2. Chapters. There are nine chapters, each of which is divided into articles. The articles fall into one of four groupings: General Requirements (Chapters 1 through 4), Specific Requirements (Chapters 5 through 7), Communications Systems (Chapter 8), and Tables (Chapter 9).

- Chapter 1—General
- Chapter 2—Wiring and Protection
- Chapter 3—Wiring Methods and Materials
- Chapter 4—Equipment for General Use
- Chapter 5—Special Occupancies
- Chapter 6—Special Equipment
- Chapter 7—Special Conditions
- Chapter 8—Communications Systems (Telephone, Data, Satellite, Cable TV, and Broadband)
- Chapter 9—Tables—Conductor and Raceway Specifications

3. Articles. The *NEC* contains approximately 160 articles, each of which covers a specific subject. It begins with Article 90, the introduction to the *Code* which contains the purpose of the *NEC*, what is covered and isn’t covered, along with how the *Code* is arranged. It also gives information on enforcement, how mandatory and permissive rules are written, and how explanatory material is included. Article 90 also includes information on formal interpretations, examination of equipment for safety, wiring planning, and information about formatting units of measurement. Here are some other examples of articles you’ll find in the *NEC*:

- Article 110—General Requirements for Electrical Installations
- Article 250—Grounding and Bonding
- Article 300—General Requirements for Wiring Methods and Materials
- Article 430—Motors, Motor Circuits, and Motor Controllers
- Article 500—Hazardous (Classified) Locations
- Article 680—Swimming Pools, Fountains, and Similar Installations
- Article 725—Class 2 and Class 3 Power-Limited Circuits
- Article 800—General Requirements for Communications Systems

4. Parts. Larger articles are subdivided into parts. Because the parts of a *Code* article aren't included in the section numbers, we tend to forget to what "part" an *NEC* rule is relating. For example, Table 110.34(A) contains working space clearances for electrical equipment. If we aren't careful, we might think this table applies to all electrical installations, but Table 110.34(A) is in Part III, which only contains requirements for "Over 1,000 Volts, Nominal" installations. The rules for working clearances for electrical equipment for systems 1,000V, nominal, or less are contained in Table 110.26(A)(1), which is in Part II—1,000 Volts, Nominal, or Less.

5. Sections. Each *NEC* rule is called a "*Code* Section." A *Code* section may be broken down into subdivisions; first level subdivision will be in parentheses like (A), (B),..., the next will be second level subdivisions in parentheses like (1), (2),..., and third level subdivisions in lowercase letters such as (a), (b), and so on.

For example, the rule requiring all receptacles in a dwelling unit bathroom to be GFCI protected is contained in Section 210.8(A)(1) which is in Chapter 2, Article 210, Section 8, first level subdivision (A), and second level subdivision (1).

Note: According to the *NEC Style Manual*, first and second level subdivisions are required to have titles. A title for a third level subdivision is permitted but not required.

Many in the industry incorrectly use the term "Article" when referring to a *Code* section. For example, they say "Article 210.8," when they should say "Section 210.8." Section numbers in this textbook are shown without the word "Section," unless they're at the beginning of a sentence. For example, Section 210.8(A) is shown as simply 210.8(A).

6. Tables and Figures. Many *NEC* requirements are contained within tables, which are lists of *Code* rules placed in a systematic arrangement. The titles of the tables are extremely important; you must read them carefully in order to understand the contents, applications, and limitations of each one. Notes are often provided in or below a table; be sure to read them as well since they're also part of the requirement. For example, Note 1 for Table 300.5(A) explains how to measure the cover when burying cables and raceways and Note 5 explains what to do if solid rock is encountered.

7. Exceptions. Exceptions are *NEC* requirements or permissions that provide an alternative method to a specific rule. There are two types of exceptions—mandatory and permissive. When a rule has several exceptions, those exceptions with mandatory requirements are listed before the permissive exceptions.

Mandatory Exceptions. A mandatory exception uses the words "shall" or "shall not." The word "shall" in an exception means that if you're using the exception, you're required to do it in a specific way. The phrase "shall not" means it isn't permitted.

Permissive Exceptions. A permissive exception uses words such as "shall be permitted," which means it's acceptable (but not mandatory) to do it in this way.

8. Informational Notes. An Informational Note contains explanatory material intended to clarify a rule or give assistance, but it isn't a *Code* requirement.

9. Tables. Chapter 9 consists of tables applicable as referenced in the *NEC*. They're used to calculate raceway sizing, conductor fill, the radius of raceway bends, and conductor voltage drop.

10. Informative Annexes. Annexes aren't a part of the *Code* requirements and are included for informational purposes only.

- Annex A. Product Safety Standards
- Annex B. Application Information for Ampacity Calculation
- Annex C. Conduit, Tubing, and Cable Tray Fill Tables for Conductors and Fixture Wires of the Same Size
- Annex D. Examples
- Annex E. Types of Construction
- Annex F. Availability and Reliability for Critical Operations Power Systems (COPS), and Development and Implementation of Functional Performance Tests (FPTs) for Critical Operations Power Systems
- Annex G. Supervisory Control and Data Acquisition (SCADA)
- Annex H. Administration and Enforcement
- Annex I. Recommended Tightening Torque Tables from UL Standard 486A-486B
- Annex J. ADA Standards for Accessible Design
- Annex K. Use of Medical Electrical Equipment in Dwellings and Residential Board-and-Care Occupancies

11. Index. The Index at the back of the *NEC* is helpful in locating a specific rule using pertinent keywords to assist in your search.

12. Changes to the *Code*. Changes in the *NEC* are indicated as follows:

- ▶ Rules that were changed since the previous edition are identified by shading the revised text.
- ▶ New rules aren't shaded like a change, instead they have a shaded "N" in the margin to the left of the section number.
- ▶ Relocated rules are treated like new rules with a shaded "N" in the left margin by the section number.

- ▶ Deleted rules are indicated by a bullet symbol “•” located in the left margin where the rule was in the previous edition. Unlike older editions the bullet symbol is only used where one or more complete paragraphs have been deleted.
- ▶ A “Δ” represents partial text deletions and or figure/table revisions somewhere in the text. There’s no specific indication of which word, group of words, or a sentence was deleted.

How to Locate a Specific Requirement

How to go about finding what you’re looking for in the *Code* book depends, to some degree, on your experience with the *NEC*. Experts typically know the requirements so well that they just go to the correct rule. Very experienced people might only need the Table of Contents to locate the requirement for which they’re looking. On the other hand, average users should use all the tools at their disposal, including the Table of Contents, the Index, and the search feature on electronic versions of the *Code* book.

Let’s work through a simple example: What *NEC* rule specifies the maximum number of disconnects permitted for a service?

Using the Table of Contents. If you’re an experienced *Code* user, you might use the Table of Contents. You’ll know Article 230 applies to “Services,” and because this article is so large, it’s divided up into multiple parts (eight parts to be exact). With this knowledge, you can quickly go to the Table of Contents and see it lists the Service Equipment Disconnecting Means requirements in Part VI.

Author’s Comment:

- ▶ The number “70” precedes all page numbers in this standard because the *NEC* is NFPA Standard Number 70.

Using the Index. If you use the Index (which lists subjects in alphabetical order) to look up the term “service disconnect,” you’ll see there’s no listing. If you try “disconnecting means,” then “services,” you’ll find that the Index indicates the rule is in Article 230, Part VI. Because the *NEC* doesn’t give a page number in the Index, you’ll need to use the Table of Contents to find it, or flip through the *Code* book to Article 230, then continue to flip through pages until you find Part VI.

Many people complain that the *NEC* only confuses them by taking them in circles. Once you gain experience in using the *Code* and deepen your understanding of words, terms, principles, and practices, you’ll find it much easier to understand and use than you originally thought.

With enough exposure in the use of the *NEC*, you’ll discover that some words and terms are often specific to certain articles. The word “solar” for example will immediately send experienced *Code* book users to Article 690—Solar Photovoltaic (PV) Systems. The word “marina” suggests what you seek might be in Article 555. There are times when a main article will send you to a specific requirement in another one in which compliance is required in which case it will say (for example), “in accordance with 230.xx.” Don’t think of these situations as a “circle,” but rather a map directing you to exactly where you need to be.

Customizing Your *Code* Book

One way to increase your comfort level with your *Code* book is to customize it to meet your needs. You can do this by highlighting and underlining important *NEC* requirements. Preprinted adhesive tabs are also an excellent aid to quickly find important articles and sections that are regularly referenced. However, understand that if you’re using your *Code* book to prepare to take an exam, some exam centers don’t allow markings of any type. For more information about tabs for your *Code* book, visit MikeHolt.com/tabs.

Highlighting. As you read through or find answers to your questions, be sure you highlight those requirements in the *NEC* that are the most important or relevant to you. Use one color, like yellow, for general interest and a different one for important requirements you want to find quickly. Be sure to highlight terms in the Index and the Table of Contents as you use them.

Underlining. Underline or circle key words and phrases in the *Code* with a red or blue pen (not a lead pencil) using a short ruler or other straightedge to keep lines straight and neat. This is a very handy way to make important requirements stand out. A short ruler or other straightedge also comes in handy for locating the correct information in a table.

Interpretations

Industry professionals often enjoy the challenge of discussing, and at times debating, the *Code* requirements. These types of discussions are important to the process of better understanding the *NEC* requirements and applications. However, if you decide you’re going to participate in one of these discussions, don’t spout out what you think without having the actual *Code* book in your hand. The professional way of discussing a requirement is by referring to a specific section rather than talking in vague generalities. This will help everyone involved clearly understand the point and become better educated. In fact, you may become so well educated about the *NEC* that you might even decide to participate in the change process and help to make it even better!

Become Involved in the *NEC* Process

The actual process of changing the *Code* takes about two years and involves hundreds of individuals trying to make the *NEC* as current and accurate as possible. As you advance in your studies and understanding of the *Code*, you might begin to find it very interesting, enjoy it more, and realize that you can also be a part of the process. Rather than sitting back and allowing others to take the lead, you can participate by making proposals and being a part of its development. For the 2023 cycle, there were over 4,000 Public Inputs and 1,956 Public Comments. This resulted in several new articles and a wide array of revised rules to keep the *NEC* up to date with new technologies and pave the way to a safer and more efficient electrical future.

Here's how the process works:

STEP 1—Public Input Stage

Public Input. The revision cycle begins with the acceptance of Public Input (PI) which is the public notice asking for anyone interested to submit input on an existing standard or a committee-approved new draft standard. Following the closing date, the committee conducts a First Draft Meeting to respond to all Public Inputs.

First Draft Meeting. At the First Draft (FD) Meeting, the Technical Committee considers and provides a response to all Public Input. The Technical Committee may use the input to develop First Revisions to the standard. The First Draft documents consist of the initial meeting consensus of the committee by simple majority. However, the final position of the Technical Committee must be established by a ballot which follows.

Committee Ballot on First Draft. The First Draft developed at the First Draft Meeting is balloted. In order to appear in the First Draft, a revision must be approved by at least two-thirds of the Technical Committee.

First Draft Report Posted. First revisions which pass ballot are ultimately compiled and published as the First Draft Report on the document's NFPA web page. This report serves as documentation for the Input Stage and is published for review and comment. The public may review the First Draft Report to determine whether to submit Public Comments on the First Draft.

STEP 2—Public Comment Stage

Public Comment. Once the First Draft Report becomes available, there's a Public Comment period during which anyone can submit a Public Comment on the First Draft. After the Public Comment closing date, the Technical Committee conducts/holds their Second Draft Meeting.

Second Draft Meeting. After the Public Comment closing date, if Public Comments are received or the committee has additional proposed revisions, a Second Draft Meeting is held. At the Second Draft Meeting, the Technical Committee reviews the First Draft and may make additional revisions to the draft Standard. All Public Comments are considered, and the Technical Committee provides an action and response to each Public Comment. These actions result in the Second Draft.

Committee Ballot on Second Draft. The Second Revisions developed at the Second Draft Meeting are balloted. To appear in the Second Draft, a revision must be approved by at least two-thirds of the Technical Committee.

Second Draft Report Posted. Second Revisions which pass ballot are ultimately compiled and published as the Second Draft Report on the document's NFPA website. This report serves as documentation of the Comment Stage and is published for public review.

Once published, the public can review the Second Draft Report to decide whether to submit a Notice of Intent to Make a Motion (NITMAM) for further consideration.

STEP 3—NFPA Technical Meeting (Tech Session)

Following completion of the Public Input and Public Comment stages, there's further opportunity for debate and discussion of issues through the NFPA Technical Meeting that takes place at the NFPA Conference & Expo®. These motions are attempts to change the resulting final Standard from the committee's recommendations published as the Second Draft.

STEP 4—Council Appeals and Issuance of Standard

Issuance of Standards. When the Standards Council convenes to issue an NFPA standard, it also hears any related appeals. Appeals are an important part of assuring that all NFPA rules have been followed and that due process and fairness have continued throughout the standards development process. The Standards Council considers appeals based on the written record and by conducting live hearings during which all interested parties can participate. Appeals are decided on the entire record of the process, as well as all submissions and statements presented.

After deciding all appeals related to a standard, the Standards Council, if appropriate, proceeds to issue the Standard as an official NFPA Standard. The decision of the Standards Council is final subject only to limited review by the NFPA Board of Directors. The new NFPA standard becomes effective twenty days following the Standards Council's action of issuance.

Temporary Interim Amendment—(TIA)

Sometimes, a change to the *NEC* is of an emergency nature. Perhaps an editing mistake was made that can affect an electrical installation to the extent it may create a hazard. Maybe an occurrence in the field created a condition that needs to be addressed immediately and can't wait for the normal *Code* cycle and next edition of the standard. When these circumstances warrant it, a TIA or "Temporary Interim Amendment" can be submitted for consideration.

The NFPA defines a TIA as, "tentative because it has not been processed through the entire standards-making procedures. It is interim because it is effective only between editions of the standard. A TIA automatically becomes a Public Input of the proponent for the next edition of the standard; as such, it then is subject to all of the procedures of the standards-making process."

Author's Comment:

- Proposals, comments, and TIAs can be submitted for consideration online at the NFPA website, www.nfpa.org. From the homepage, look for "Codes & Standards," then find "Standards Development," and click on "How the Process Works." If you'd like to see something changed in the *Code*, you're encouraged to participate in the process.



GLOBAL CHANGES IN THE 2023 *NATIONAL ELECTRICAL CODE*

Introduction to Global Changes in the 2023 *National Electrical Code*

Global Changes—The 2023 *NEC* cycle was very active with 4,006 Public Inputs, 1,805 First Revisions, 1,956 Public Comments, 900 Second Revisions, 164 Correlating Revisions, and 55 Certified Amending Motions. This resulted in several new articles and a wide array of new and revised rules. In addition to all this activity, it was a busy year for the correlating committee who eliminated “subjective terms,” and tasked the Code-Making Panels with reorganizing many of the rules that were long paragraphs into list formats. Long terms were replaced with acronyms where possible. Redundant language was removed, and definitions were consolidated with nearly all being relocated to Article 100. Many of these changes were made to bring the existing *NEC* text in line with the *NEC* Style Manual requirements.

New Medium Voltage Articles

Several new articles were created to address the growing number of medium voltage installations that are being installed under the purview of the *NEC*. Some proposed medium voltage articles were also rejected. This will be worked out in the second revision of the *Code*.

The medium voltage articles that are in the 2023 *NEC* are:

- **Article 235. Branch Circuits, Feeders, and Services Over 1000V ac, 1500V dc, Nominal.**
- **Article 245. Overcurrent Protection for Systems Rated Over 1000V ac, 1500V dc.**
- **Article 305. General Requirements for Wiring Methods and Materials for Systems Rated Over 1000V ac, 1500V dc, Nominal.** This article replaces Article 399 because Article 305 is a more logical location for the information.
- **Article 315. Medium Voltage Conductors, Cable, Cable Joints, and Cable Terminations.** This article replaces Article 311 in a more logical location for the information.
- **Article 495. Equipment Over 1000V ac, 1500V dc, Nominal.** This article replaces Article 490 in the 2020 *NEC*.

Other New Articles Found in the 2023 *NEC*

- **Article 369. Insulated Bus Pipe (IBP)/Tubular Covered Conductors (TCC) Systems.** A cylindrical solid or hollow conductor with a solid insulation system, having conductive grading layers and a grounding layer embedded in the insulation, and provided with an overall covering of insulating or metallic material.
- **Article 371. Flexible Bus Systems.** This is an engineered product like cable bus systems but is instead using thin pieces of copper bus covered with insulation. It is installed in a support system much like cable tray but is specifically designed for the flexible bus.

- **Article 722. Cables for Power-Limited Circuits, Fault-Managed Power Circuits, and Optical Fiber.** This new article creates a common set of cabling rules for Articles 725, 760, and 770 to avoid repeating many of the common general requirements in each of those articles.
- **Article 724. Class 1 Power-Limited Circuits and Class 1 Power-Limited Remote-Control and Signaling Circuits.** A new article was created for Class 1 power-limited circuits to separate them from Class 2 and Class 3 power-limited circuits. This revision adds clarity and better usability to the *Code*. Historically, Class 1 circuits were either nonpower-limited or power limited. But now Chapter 7 only addresses Class 1 power-limited circuits with a power limitation of 30V and 1000 VA. Nonpower-limited remote control and signaling circuits will be covered by the first four chapters of the *NEC*.
- **Article 726. Class 4 Fault-Managed Power Systems.** This article covers a new class of power systems that provide excellent protection for people by limiting exposure times (short pulses or fast shut-off times) and eliminating repetitive impulses. In addition to increased personnel safety, they utilize sophisticated monitoring and control systems providing better equipment monitoring and protection rather than a traditional OCPD.

ARTICLE

90

INTRODUCTION TO THE *NATIONAL ELECTRICAL CODE*

Article 90—Introduction to the *National Electrical Code*

90.1 Scope—This section was renamed from “Purpose” to “Scope” and contains new text to clarify the function of the section and provide a clear description of the scope of Article 90.

90.2 Use and Application—What was 90.1 is now 90.2 with some editorial revisions to improve the usability of the NEC.

90.4 Enforcement—Along with the rest of Article 90, this section was reorganized for ease of use. That's a plus for all of us.

90.5 Mandatory Rules, Permissive Rules, and Explanatory Material, (C) Explanatory Material—This change clarifies that references to other standards are not required to indicate the date if the most current reference is to be used. Another revision clarifies that the Informative Annex material is not enforceable as a requirement.

CHAPTER

1

GENERAL RULES

Article 100—Definitions

Article 100 Global Summary—Definitions across the entire Code were moved from the individual articles to Article 100 with some being revised and a number of new definitions being added. There are several that are worth mention and they are covered in the following material.

Article 110—General Requirements for Electrical Installations

110.3 Use and Product Listing (Certification) of Equipment—A new list item (A)(8) was added to address cybersecurity for network-connected life safety equipment and QR codes. In addition, a few other improvements were made to 110.3(B).

110.8 Wiring Methods—The words “or premises wiring system” were added to clarify that the covered wiring methods are not limited to installation on or in buildings.

110.12 Mechanical Execution of Work—The *Code* recognizes the importance of quality installations in this section. Some editorial changes were made to clarify how to recognize “quality.”

110.16 Arc-Flash Hazard Warning—The title and rule of 110.16(B) were updated to expand the arc-flash marking requirements from only service equipment to include feeder-supplied equipment. Furthermore, the ampacity threshold requirement was changed from 1200A to 1000A.

110.17 Servicing and Maintenance of Equipment—A new section was added to address the servicing and maintenance of equipment

110.20 Reconditioned Equipment—This new section identifies the general requirements for reconditioned equipment.

110.22 Identification of Disconnecting Means—Additional language was added to clarify the identification of the disconnect supply source.

110.26 Spaces About Electrical Equipment—Several requirements for equipment doors that open into the path of egress were relocated within this section and now apply to all electrical installations—not just large equipment. Standing areas of working space are now required to be relatively flat. In addition, “service equipment” now requires dedicated equipment space.

CHAPTER

2

WIRING AND PROTECTION

Article 200—Use and Identification of Grounded Conductors

200.6 Means of Identifying Grounded Conductors—Editorial revisions were made throughout 200.6(A) to remove the repetitive phrase “insulated grounded conductor.” An incorrect reference to 690.41 was updated. In addition, 200.6(D) was clarified by adding the words “nominal voltage” before the word “system.”

Article 210—Branch Circuits

210.1 Scope—Article 210 provides the general requirements for branch circuits not over 1000V ac or 1500V dc, such as conductor sizing, over-current protection, identification, GFCI and AFCI protection, as well as receptacle outlet and lighting outlet requirements.

210.4 Multiwire Branch Circuits—An editorial change was made to 210.4(A) which clarifies what the source of the multiwire branch circuit is, and revisions to 210.4(C) Exception 1 and Exception 2 clarify when a line-to-line load may be connected to a multiwire branch circuit.

210.5 Identification for Branch Circuits—The phrase “voltage class” was replaced with “nominal voltage” in (C) to clarify the identification requirements for branch-circuit phase conductors.

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel—For over 30 years GFCI requirements have been added to the *NEC*, and this *Code* cycle continues that trend. The term “listed Class A GFCI” replaced “ground-fault circuit-interrupter” throughout the rule. It is now clear that the path of measurement for a power-supply cord is related to the receptacle and not the appliance from which it came. An interesting Exception was added for exhaust fans, nondwelling GFCI requirements

have taken over in food service areas, and protection is required for all outlets in garages, accessory buildings, boathouses, and aquariums. These rules now basically say that where there is water you need a GFCI!

210.11 Branch Circuits Required—There has been some confusion about what this section required in a garage. Language was added to clarify the intent of these rules.

210.12 Arc-Fault Circuit-Interrupter Protection—There were no big changes here, but the panel did a great job organizing and editing this section to address over 50 public inputs while making the whole thing easier to read and use.

210.17 Guest Rooms and Guest Suites—You need to sit up and take notice of this change. Assisted living facilities with permanent provisions for cooking were added to the list of guest rooms and guest suites that must have branch circuits installed to meet the dwelling unit requirements.

210.19 Conductors—Minimum Ampacity and Size—This section had no technical change. It was simply reorganized for readability.

210.23 Multiple-Outlet Branch Circuits—This section was expanded to accommodate 10A branch circuits and provides some rules for their use.

210.52 Dwelling Unit Receptacle Outlets—The phrase “stationary appliance” was added to the list of things in subdivision (A) that do not count as wall space, subdivision (C) has some impactful technical changes, and subdivision (D) was edited for clarity and usability.

210.62 Show Windows—This rule was clarified to specify that the required receptacles must be located to service the entire window area.

210.65 Meeting Rooms—New wording was added to require additional meeting room floor outlets.

210.70 Lighting Outlets Required—A new sentence clarifies that a switch or wall-mounted control device must not rely exclusively on a battery, that a lighting outlet for the laundry area must be provided, that accessory buildings with power are required to have a lighting outlet, and that required exterior lighting outlets must be located on the exterior of the building.

Article 215—Feeders

Conductor Sizing—This section was reorganized for readability without technical changes. Changes to (B) clarify that the feeder grounded conductor cannot be smaller than the EGC.

215.15 Barriers—This new section requires inadvertent contact protection for the line-side busbars or terminals of equipment supplied by feeder taps or transformer secondary conductors.

215.18 Surge Protection—New rules were added to require surge protection for distribution equipment that supplies feeders.

Article 220—Branch-Circuit, Feeder, and Service Load Calculations

220.1 Scope—The scope was edited to reflect the addition of Parts VI and VII.

220.5 Calculations—The floor area calculation was relocated and was expanded to include the floor area of garages

220.53 Appliance Load—Dwelling Unit(s)—Editorial changes were made in this section to clarify to what the rule applies.

220.57 Electric Vehicle Supply Equipment (EVSE) Load—This new section specifies the load that must be included for electric vehicle supply equipment.

220.60 Noncoincident Loads—Revisions in this section clarify that an air-conditioning load can be considered a noncoincident load.

220.70 Energy Management Systems (EMSs)—A new section was added for energy management systems that can control the maximum load of a service.

220.87 Determining Existing Loads—The general Exception text was moved into the list item (1) Exception to indicate that it only applies to the one-year maximum demand data limiting its use with renewable energy systems.

220.120 Receptacle Loads—This is a relocated requirement from 555.6 for marina receptacle loads.

Article 225—Outside Branch Circuits and Feeders

225.1 Scope—The scope was revised to say this article does not apply to outside branch circuits and feeders over 1000V ac or 1500V dc

225.27 Raceway Seal—Two references were added to clarify the requirements for sealing raceways.

225.41 Emergency Disconnects—This new section requires outside emergency disconnects for feeders supplied to one- and two-family dwelling units, and mirrors the requirements in 230.85 for service-supplied dwelling units.

225.42 Surge Protection—This new section requires surge protection for various occupancies supplied by feeders.

Article 230—Services

230.1 Scope—The scope was revised to limit the application of this article to systems not greater than 1000V ac or 1500V dc.

230.7 Service Conductors Separate from Other Conductors—Handholes and underground boxes were added to the items that must not contain both service conductors and other conductors.

230.8 Raceway Seal—This section was expanded to include a requirement to seal service raceways anywhere they enter a building or structure.

230.24 Clearances—This rule was intended to apply to all Article 680 installations, so the title in (D) was updated to reflect this intent.

230.43 Wiring Methods for 1000V, Nominal, or Less—The use of properly identified Type TC-ER cable was expanded, and flexible bus systems are now an option as service-entrance conductors.

230.62 Service Equipment—Enclosed or Guarded—Language was added to clarify where line-side terminal barriers are required.

230.67 Surge Protection—This section was expanded to cover occupancies other than dwellings and to establish a minimum nominal discharge current for surge-protective devices.

230.71 Maximum Number of Disconnects—This section caused a lot of stir in the 2020 *Code* cycle by requiring a physical barrier between each of the sections of a meter pack or switchgear without a main disconnecting means. Several revisions here aim to solve some of the field issues created by the rules last cycle while preserving the intended added safety.

230.85 Emergency Disconnects—This section was editorially revised into parent text and second level subdivisions with some technical changes.

Article 240—Overcurrent Protection

240.4 Protection of Conductors—There was a laundry list of revisions in this section. Here is the rundown.

- ▶ Overcurrent protective device requirements for 800A or less were clarified.
- ▶ The word “wire” was replaced with “conductor.”
- ▶ Type CF fuses are now permitted.
- ▶ A reference to Article 440 Part IV was added to Table 240.4(G).
- ▶ A new (D)(3) was added to address 14 AWG copper-clad aluminum conductors.
- ▶ A new (H) was added to correlate dwelling unit service and feeder conductors with the general requirements.

Whew!

240.6 Standard Ampere Ratings—A 10A standard rating was added to the fuse and circuit-breaker table, and a need for cybersecurity awareness was addressed in a new Informational Note for remotely accessible adjustable trip circuit breakers.

240.24 Location of Overcurrent Protective Devices—Revisions to this rule clarify that OCPDs are no longer permitted in any bathroom or area with showers.

Article 242—Overvoltage Protection

242.9 Indicating—A new section was added requiring an SPD to indicate that it is functioning properly.

Article 250—Grounding and Bonding

250.36 Impedance Grounded Systems—480V to 1000V—The title of this section was edited to reflect the actual type of system being referenced. In addition, terms throughout the section were revised to match those defined in Article 100 with no technical change.

250.53 Grounding Electrode Installation Requirements—The requirement for electrode surfaces to be free from nonconductive coatings was relocated to (A) and the title and text of (E) were updated to more accurately reflect the content of the rule and permission to use copper-clad aluminum as a bonding jumper.

250.64 Grounding Electrode Conductor Installation—Copper-clad aluminum has been added to 250.64(B), cable armor was added to the title of 250.64(E) to reflect the contents of the rule, and you are now prohibited from running a GEC through an enclosure vent.

250.66 Sizing Grounding Electrode Conductors—The description of where this section applies was removed from the opening paragraph to make it easier to read.

250.68 Grounding Electrode Conductor and Bonding Jumper Connection to Grounding Electrodes—The measurement rule for the GEC connection to water piping was clarified.

250.70 Grounding Electrode Conductor Termination Fittings—This section was reorganized into two first level subdivisions and editorially revised for clarity. An Informational Note providing helpful information was also added.

250.92 Bonding Metal Parts Containing Service Conductors—Threaded entries were added to the requirements in (B)(2) as an acceptable bonding connection.

250.94 Bonding for Communications Systems—There were several editorial changes to provide clarification in this section.

250.102 Neutral Conductor, Main Bonding Jumper, System Bonding Jumper, Supply-Side Bonding Jumper, Load-Side Bonding Jumper—The requirements of subdivision (C), including the Table, were clarified for ease of use without technical change.

250.109 Metal Enclosures—This section was expanded to include plaster (mud) rings and extension rings as part of the equipment grounding path.

250.140 Frames of Ranges, Ovens, and Clothes Dryers—This rule was reorganized into parent text and two first level subdivisions, and the former Exception was expanded.

250.148 Continuity of Equipment Grounding Conductors and Attachment in Boxes—The language in this section has been in process for a while. It was revised once again this cycle making it clear which EGCs must be connected to each other or to the box.

CHAPTER

3

WIRING METHODS AND MATERIALS

Article 300—General Requirements for Wiring Methods and Materials

300.3 Conductors—The rule requiring all conductors of the circuit to be in the same raceway added language to include conduit bodies. In addition, the voltage ranges were expanded to include both 1000V ac and the newly added 1500V dc.

300.4 Protection Against Physical Damage—The phrase “nonmetallic conduit” was replaced with PVC and RTRC, protection requirements for bored holes in wood members and under corrugated roof decks were clarified and expanded, and the requirement for a protective bushing on raceways containing 4 AWG and larger conductors was clarified.

300.5 Underground Installations—The voltages referenced in the rules were expanded to include “1500V dc” and the Table was expanded to include burial requirements for EMT.

300.6 Protection Against Corrosion—The rules in this section were expanded to apply to all enclosures.

300.12 Mechanical Continuity—Raceways and Cables—Conduit bodies were added to this rule for consistency with other sections.

300.14 Length of Free Conductors at Outlets, Junctions, and Switch Points—New language clarifies that the required 6 in. of free conductor can be spliced!

300.15 Boxes or Fittings—The language was revised to clarify that boxes are not required at wiring method transition points.

300.25 Exit Stair Towers—A revision to the rule and a new Exception permit stairwell exterior egress lighting to be powered from the stairwell circuit.

Article 310—Conductors for General Wiring

310.10 Uses Permitted—Several editorial changes were made throughout this section for clarity and increased ease of use.

Article 312—Cabinets, Cutout Boxes, and Meter Socket Enclosures

312.5 Cabinets, Cutout Boxes, and Meter Socket Enclosures—The text was revised to make it clear this section applies to both cable assemblies and insulated conductors that enter an enclosure.

312.8 Overcurrent Device Enclosures—A new list item adds bending space requirements. Editorial revisions were made to clarify that power management equipment can be field installed in a switch or overcurrent device enclosure.

312.10 Screws or Other Fasteners—This new section addresses the hazards created by screws or fasteners that enter the wiring spaces of enclosures.

Article 314—Boxes, Conduit Bodies, and Handhole Enclosures

314.5 Screws or Other Fasteners—This new section provides requirements for field-installed screws or fasteners used in the boxes, fittings, and enclosures covered by this article.

314.17 Conductors and Cables Entering Boxes, Conduit Bodies, or Fittings—The phrase “and cables” was added in the title and to the parent language of (A) and (B) of this section to clarify that these rules apply to both conductors and cables.

314.23 Supports—This section now clarifies that a cord connected to a box with a hub must be made with a listed cord grip marked for use with a threaded hub.

314.25 Covers and Canopies—Conduit bodies were added to the types of enclosures covered in this section. In addition, connecting metal covers or plates to the EGC are now clearly required.

314.29 Boxes, Conduit Bodies, and Handhole Enclosures to be Accessible—The required accessibility for wiring in boxes, conduit bodies, and handhole enclosures now extends to the devices they contain, and the Exception allows them to be covered.

Article 320—Armored Cable (Type AC)

320.23 In Accessible Attics—The phrase “floor joists” was removed from the title and text of (A).

320.30 Securing and Supporting—A new sentence was added to say that AC cable fittings are permitted as a means of cable support.

Article 330—Metal-Clad Cable (Type MC)

330.10 Uses Permitted—The word “damp” was added to list item (11).

330.30 Securing and Supporting—A new sentence was added to say that MC cable fittings are permitted as a means of cable support.

Article 334—Nonmetallic-Sheathed Cable: Types NM and NMC

334.10 Uses Permitted—List item (2) now permits the use of NM cable in detached garages associated with multifamily dwellings where the garages are of Types III, IV, and V construction.

334.12 Uses Not Permitted—Two new list items expand the places in which NM cable cannot be used.

334.15 Exposed Work—New language requires protection from abrasion at the entrance and exit of conduit or tubing used to provide protection for NM cable.

334.19 Cable Entries—A new requirement was added for the sheath of NM cable to extend at least $\frac{1}{4}$ in. past any cable clamp or cable entry.

334.40 Boxes and Fittings—Splicing self-contained devices is now permitted in concealed locations for both existing and new buildings.

Article 352—Rigid Polyvinyl Chloride Conduit (PVC)

352.10 Uses Permitted—A new subdivision (B) permits PVC to be encased in concrete and subdivision (K), Physical Damage, was added.

352.44 Expansion Fittings—The previous text of this section became subdivision (A), Thermal Expansion and Contraction, and a new subdivision (B), Earth Movement, was added.

Article 356—Liquidtight Flexible Nonmetallic Conduit (LFNC)

356.10 Uses Permitted—A new list item (8) permits LFNC to be installed in locations subject to severe corrosive influences.

Article 358—Electrical Metallic Tubing (EMT)

358.10 Uses Permitted—Two permitted uses for EMT were added.

Article 362—Electrical Nonmetallic Tubing (ENT)

362.10 Uses Permitted—Editorial changes were made in list item (2) and its Exception, and to list items (5) and (7). List item (6) was added to allow concrete encasement.

Article 376—Metal Wireways

376.60 Equipment Grounding Conductor—This new section permits a listed metal wireway to be used as an EGC.

CHAPTER

4

EQUIPMENT FOR GENERAL USE

Article 404—Switches

404.1 Scope—New language tells us that Article 404 does not apply to battery-powered wireless control equipment.

404.14 Rating and Use of Switches—A new subdivision (D) was added addressing push-in terminals, and 15A and 20A snap switches not marked CO/ALR can now be used with copper-clad aluminum.

Article 406—Receptacles, Attachment Plugs, and Flanged Inlets

406.3 Receptacle Rating and Type—The title of (C) was changed to clarify that this section covers receptacles marked CO/ALR and a new subdivision (D) is another change related to the use of copper-clad aluminum conductors.

406.4 General Installation Requirements—The titles of both (B) and (C) were changed to be specific as to the type of grounding conductor covered in the subdivision. In addition, a new last sentence was added to (D)(3) requiring a GFCI to be a listed device.

406.6 Receptacle Faceplates—One of the coolest recent additions to the array of device faceplates is the integral night light and USB charger faceplate. Changes this cycle limit the maximum power they can use.

406.9 Receptacles in Damp or Wet Locations—Hinged covers of outlet box hoods must now open at least 90° after installation, other than 15A and 20A receptacles are required to be weather resistant, and bathroom receptacle rules have become more complicated.

406.12 Tamper-Resistant Receptacles—These rules were expanded once again to include additional required locations.

Article 408—Switchboards, Switchgear, and Panelboards

408.4 Circuit Directory and Descriptions of Circuit Source—The term “identification” in 408.4(A) was replaced with the term “description” in this section (and in the title) to avoid confusion with the defined term “identified.” Additional language was added to subdivision (B) that requires the marking to include the physical location of the power source.

408.9 Replacement Panelboards—This is a new section that provides guidance for installing new “guts” in an existing enclosure.

408.43 Panelboard Orientation—This rule was expanded to prohibit face-down installations of panelboards.

Article 410—Luminaires, Lampholders, and Lamps

410.10 Luminaires in Specific Locations—Ceiling fans with light kits are not permitted in the bathtub/shower zone, and changes to 410.10(F) prohibit luminaire installations within 1½ in. of a roof deck.

410.42 Luminaire(s) with Exposed Conductive Surfaces—This section was condensed into parent text and an Exception, and the title was changed to reflect the new content.

410.71 Disconnecting Means for Fluorescent or LED Luminaires that Utilize Double-Ended Lamps—This rule was relocated here from 410.130(G) since LEDs fall under the scope of Part VI of Article 410.

410.184 Ground-Fault Circuit-Interrupter (GFCI) Protection and Special Purpose Ground-Fault Circuit-Interrupter (SPGFCI) Protection—The title and text of this rule were revised to clarify that GFCI protection is required when horticultural lighting is connected using flexible cords connected with separable connectors or attachment plugs. In addition, a new Exception addresses SPGFCI protection for circuits over 150V to ground.

Article 422—Appliances

422.5 GFCI Protection—The title of this section was shortened to use “GFCI,” and drinking water fountains were added to the list of appliances requiring GFCI protection in (A).

422.13 Storage-Type Water Heaters—A couple minor editorial changes clarify what we are sizing and how the 125 percent applies.

422.16 Flexible Cords—A new list item in (A)(3) contains information about flexible cords relocated from 422.43, and some other editorial changes were made to (B) for clarity.

422.18 Ceiling-Suspended (Paddle) Fans—Revisions to the rules clarify that fan boxes must be identified for fan support. In addition, the terms “weight supporting ceiling receptacle” (WSCR) and “weight supporting attachment fitting” (WSAF) make an appearance along with a rule addressing the installation of paddle fans in tub and shower areas.

422.33 Disconnection of Cord-and-Plug-Connected or Attachment Fitting-Connected Appliances—The rule in (B) clarifies that a cord-and-plug connection for a range is considered accessible by the removal of the drawer at the front of the range.

Article 424—Fixed Electric Space-Heating Equipment

424.4 Branch Circuits—The title and text of (B) were revised to clarify that this subdivision is about the sizing of the branch-circuit “conductors.”

Article 430—Motors

430.1 Scope—This section is unusual in that it has a pictorial directory of the parts of the article along with the associated references in its scope. As complex as this article is, this tool is invaluable.

430.6 Conductor Ampacity and Motor Rating Determination—Editorial and organizational changes were made throughout this section for clarity and usability.

430.31 General—This section was reduced from three paragraphs and reorganized into parent text and two subdivisions with no technical changes.

430.83 Ratings—A new subdivision (F) was added regarding short-circuit ratings of motor controllers.

Article 440—Air-Conditioning and Refrigerating Equipment

440.8 Single Machine and Location—This section was expanded to prohibit air-conditioning and refrigeration equipment from being installed in a bathtub or shower zone.

440.11 General—This rule was revised to require disconnecting means with doors that expose live parts to be lockable or require tools to open them when installed in areas readily accessible to unqualified persons.

440.14 Location—A revision to this rule points us to Article 110 for working space requirements at an air-conditioning disconnect.

440.22 Application and Selection—This section was reorganized into a rule and two Exceptions instead of a long sentence.

Article 445—Generators

445.11 Marking—This section was edited for clarity and a new requirement for the nameplate to be accessible was added.

445.19 Emergency Shutdown of Prime Mover—These rules were relocated here from 445.18 and only relate to the emergency shutdown requirements that apply to the prime mover.

Article 450—Transformers and transformer vaults (including secondary ties)

450.1 Scope—The previous exceptions in the text were converted to rules and the references to complete articles were removed to comply with the requirements of the *NEC* Style Manual.

450.10 Grounding and Bonding—The word “Bonding” was added to the title of the section as the rule address both grounding and bonding.

Article 480—Stationary Standby Batteries

Article 480 Stationary Standby Batteries—The title of the article was changed from “Storage Batteries” to “Stationary Standby Batteries.”

480.4 Battery and Cell Terminations—Editorial revisions clarify when antioxidants must be used.

480.10 Battery Locations—Personnel doors in battery rooms must now open 90° in addition to having listed panic or fire exit hardware.

CHAPTER

5

SPECIAL OCCUPANCIES

Article 500—Hazardous (Classified) Locations, Classes I, II, and III, Divisions 1 and 2

500.1 Scope—This scope statement was revised and some of the Informational Notes were relocated into the rule.

500.4 Documentation—Revisions clarify that documentation on an area classification drawing is required for areas that require classification and areas deemed unclassified.

500.5 Classifications of Locations—This rule, like many others this cycle, was reorganized into a list format.

Article 501—Class I Locations

501.1 Scope—The scope statement was edited to match the scope more closely in Article 500.

501.10 Wiring Methods—There were many changes throughout this section that made the rules easier to read and understand. A few of the more notable changes are listed in the analysis below.

501.15 Sealing and Drainage—The boundary seal rules from 501.10(B)(1) were relocated to this section and the wiring methods permitted to cross the Class I Division 2 boundary were expanded. Some corrections were made to language adopted in the 2020 *NEC* and the Exception permitting cables to pass through a Division 2 location without a seal was revised.

501.30 Grounding and Bonding—The title of this section was shortened, there were several editorial changes driven by the effort to make these rules comply with the *NEC* Style Manual, and some clarifications and technical revisions identify how things should be bonded and grounded.

501.135 Utilization Equipment—Luminaires were added to the list of equipment included in this rule.

501.145 Receptacles and Attachment Plugs, Class I, Division 1 and Division 2—The scope of this article was expanded to require receptacles and attachment plugs to be listed.

Article 502—Class II Locations

502.10 Wiring Methods—As we have seen in other areas of Chapter 5, revisions were made to allow the use of coated RMC and IMC. The bonding requirements for LFMC were clarified as well.

502.15 Sealing—An Informational Note about electrical sealing putty was relocated into the rule.

502.30 Grounding and Bonding—The title of this section was shortened, there were several editorial changes driven by the effort to make these rules comply with the *NEC* Style Manual, and some clarifications and technical revisions identify how things should be bonded and grounded.

Article 511—Commercial Garages, Repair and Storage

511.3 Area Classification—Clarifications were made to the ventilation rules in (E), so they are easier to understand.

511.7 Wiring and Equipment Installed Above Hazardous (Classified) Locations—The term “Class I” was replaced by “Hazardous (Classified).” This section went through quite a transformation as it was reorganized into a list format with additional requirements for listed fittings and EGCs added to the mix.

511.8 Underground Wiring Hazardous (Classified) Locations—

The term “Class I” was replaced by “Hazardous (Classified).” This section was reorganized into a list format and the Exception was relocated into the rule.

Article 514—Motor Fuel Dispensing Facilities**514.7 Wiring and Equipment Above Hazardous (Classified) Locations—**

The term “Class I” was replaced by “Hazardous (Classified).” If these changes seem vaguely familiar, it is because this is a parallel version of the reorganization and revisions that happened in 511.7

Article 517—Health Care Facilities

517.1 Scope—Text was relocated from an Informational Note in 517.11 that had information related to the scope of this article.

517.10 Applicability—A clarification in 517.10(B) says that a pharmacy area is not considered a health care facility.

517.13 Equipment Grounding Conductor for Receptacles and Fixed Electrical Equipment in Patient Care Spaces—Editorial revisions were made throughout this section and it was clarified that metal faceplates can be bonded with the mounting screws.

Article 518—Assembly Occupancies

518.2 General Classification—Casinos were added to the list of places of assembly in (A).

Article 547—Agricultural Buildings

547.20 Wiring Methods—Permitted wiring methods for agricultural spaces was relocated here from 547.5 and editorially revised.

547.25 Flexible Connections—This new section is reorganized text that was relocated here from 547.5(D) with no technical change.

547.26 Physical Protection—This new section was relocated here from 547.5(E) and some requirements were added.

547.44 Equipotential Planes and Bonding of Equipotential Planes—This new section was relocated here from 547.10, and the point where the equipotential plane must be connected was clarified.

Article 555—Marinas, Boatyards, Floating Buildings, and Commercial and Noncommercial Docking Facilities

555.4 Location of Service Equipment—There were two changes to the location requirements for service equipment.

555.15 Replacement of Equipment—A new section was added on how to deal with equipment that is replaced at docking facilities.

555.30 Electrical Equipment and Connections—The title of this section was revised to reflect its contents and terminology used in the rules was revised for clarity.

555.34 Wiring Methods and Installation—A few changes were made in this section to compensate for the harsh environment in marinas.

555.35 Ground-Fault Protection of Equipment (GFPE) and Ground-Fault Circuit Interrupter—This section was reorganized and rules from other *Code* sections for GFCI protection were relocated to this one. Most of these rules had no technical change but do have new section numbers.

555.36 Shore Power Receptacle Disconnecting Means—A new subdivision adds a requirement for an emergency electrical disconnect.

555.37 Equipment Grounding Conductor—This section was reorganized and editorially revised with no technical changes.

555.38 Luminaires—A new subdivision addresses the requirements for luminaire installations and retrofits.

CHAPTER

6

SPECIAL EQUIPMENT

Article 600—Electric Signs and Outline Lighting

600.5 Branch Circuits—The text excluding non-public doors from the rules in (A) was converted to an Exception and a new Exception was added permitting associated loads to be on the sign circuit. It is now clear that when electrical enclosures are integral to signs, they can be used as junction boxes in (D).

600.6 Disconnects—Editorial revisions to the sign disconnect rules make an impossible rule possible.

Article 620—Elevators, Dumbwaiters, Escalators, Moving Walks, Platform Lifts, and Stairway Chairlifts

620.6 Ground-Fault Circuit-Interrupter Protection for Personnel—Receptacles located in truss interiors now require GFCI protection, and a nice reorganization of the content into three subdivisions makes this much easier to read.

620.22 Branch Circuits for Car Lighting, Receptacle(s), Ventilation, Heating, and Air-Conditioning—The permitted locations of the branch-circuit OCPD in (B) for air-conditioning and heating were clarified.

Article 625—Electric Vehicle Power Transfer System

625.6 Listed—A clarification to this rule limits the equipment required to be listed by this article.

625.40 Electric Vehicle Branch Circuit—Multiple units of EVSE can finally share a circuit. It is about time!

625.43 Disconnecting Means—EVSE and WPTE are now permitted to have remotely located disconnects!

625.49 Island Mode—This new section provides the requirements for EVPE and bidirectional EVSE to be part of an interconnected power system operating in island mode.

Article 630—Electric Welders

630.8 Ground-Fault Circuit-interrupter Protection for Personnel—GFCI protection makes yet another appearance in the workplace and is now required for receptacles used for hand tools and portable lighting.

Article 680—Swimming Pools, Fountains, and Similar Installations

680.5 Ground-Fault Circuit-Interrupter (GFCI) and Special Purpose Ground-Fault Circuit-Interrupter (SPGFCI) Protection—The section title and rules were expanded to include the use of SPGFCIs, and the section was split into three parts.

680.7 Grounding and Bonding—These rules were reorganized, the title was updated to reflect the content of the section, and now it is clear that an EGC in a corrosive environment must be insulated.

680.10 Electric Water Heaters and Heat Pumps—A revision to the title and text now includes heat pumps in the scope of this section.

680.14 Corrosive Environment—The title was revised to reflect the contents of the rule. The requirement for the wiring methods to be listed was removed.

680.21 Pool Pump Motors—The title of (C) was revised to reflect the need for GFCI protection, and SPGFCI requirements were added.

680.22 Receptacles, Luminaires, and Switches—All receptacles up to 60A within 20 ft of a pool wall are now required to be ground-fault protected, and the specific equipment listed in (A)(4) now requires SPGFCI protection if operating at over 150V to ground.

680.26 Equipotential Bonding—There were a variety of editorial changes and clarifications in this section having to do with when equipotential bonding is required, how to measure the depth of the perimeter bond ring, when a pool shell is exempt from bonding, and when to bond metal parts close to a pool.

680.32 Ground-Fault Circuit-Interrupter (GFCI) and Special Purpose Ground-Fault Circuit-Interrupter (SPGFCI) Protection—Another set of revisions driven by the new SPGFCI requirements expand the application of rules in this section.

680.43 Indoor Installations—Following a theme throughout this article, the addition of SPGFCIs in (A)(2) expands the ground-fault protection requirements for hot tubs.

680.44 Ground-Fault Circuit-Interrupter (GFCI) and Special Purpose Ground-Fault Circuit-Interrupter (SPGFCI) Protection—Another section and another change driven by SPGFCIs.

680.50 General—A reorganization of this section into a list format makes it easier to read and new requirements for the location of electrical equipment were added in (B).

680.54 Connection to an Equipment Grounding Conductor—A revision to (B) establishes the minimum size of the bonding conductor for fountains. The new section (C) identifies the portion of a splash pad required to have equipotential bonding.

680.58 GFCI or SPGFCI Protection of Receptacles—This is a small change with a large impact as all receptacles around fountains must now have ground-fault protection.

680.59 Ground-Fault Protection for Permanently Installed Nonsubmersible Pumps—All nonsubmersible pump motors must now be ground-fault protected.

680.74 Bonding—A new Exception exempts small devices from equipotential bonding requirements.

Article 690—Solar Photovoltaic (PV) Systems

690.4 General Requirements—Revisions to (B) require field labeling, the defined term “electronic power converters” replaces outdated terminology, and floating solar arrays must be identified for the purpose.

690.7 Maximum PV System Direct-Current Circuit Voltage—There were no technical changes here, but the Code-Making Panel did a nice job reorganizing everything.

690.12 Rapid Shutdown of PV Systems on Buildings—A new Exception 2 exempts detached nonenclosed structures from rapid shutdown requirements, some editorial revisions clarify the application of these rules, and rapid shutdown marking requirements were relocated to this section.

690.15 PV Equipment Disconnect or Isolating Device—Revisions to (A) clarify disconnecting means requirements, when you can use an isolating device as part of listed equipment, and generally reorganized (C) and (D).

690.31 Wiring Methods—This section was massively reorganized. Clarifications were made and requirements were added for single-conductor cables and systems operating over 1000V.

690.43 Equipment Grounding and Bonding—The title in (C) was changed to “Location” as it now specifies when EGCs can be run with circuit conductors and when they can be run separate from circuit conductors.

690.56 Identification of Power Sources—As part of cleaning up redundant language, this section was condensed, and a reference to 705.10 informs us where we can find the information previously located here.

Article 691—Large-Scale Photovoltaic (PV) Electric Supply Systems

691.4 Special Requirements for Large-Scale PV Electric Supply Stations—Editorial revisions clarify how access is to be restricted to these sites and a requirement to monitor the site was added.

Article 695—Fire Pumps

695.1 Scope—A new list item in (B) exempts one- and two-family dwelling unit water pumps used for fire suppression from the requirements of 695.

695.6 Power Wiring—Minor editorial revisions help clarify what a complete fire resistive cable system is. The text in (B)(1) was reorganized into a list, the method to determine full-load current was clarified, and raintight fittings are now required for EMT.

695.7 Fire Pump Controller Voltage Drop—Editorial revisions clarify the meaning of the rule and correlate it with the corresponding language in NFPA 20.

CHAPTER

7

SPECIAL CONDITIONS

Article 700—Emergency Systems

700.1 Scope—A new Informational Note, relocated here from the definitions, provides a great description of why emergency systems are installed.

700.3 Tests and Maintenance—Changes to test and maintenance protocols now require emergency systems to be commissioned. Other changes to the rules for temporary power sources require listed interlocking equipment, and a permanent label outside the connection for temporary power.

700.4 Capacity and Rating—Requirements were added to accommodate large transient loads when sizing emergency power sources, editorial revisions clarify the application of these rules, and a new subdivision provides rules for parallel power sources.

700.6 Signals—An expansion to the rules in this section require network annunciation of fault signals, and the required battery charging signal was clarified.

700.8 Surge Protection—Surge protection is now required for emergency system switchgear.

700.11 Wiring, Class-2-Powered Emergency Lighting Systems—Since the PoE lighting train is gaining momentum, a new section for Class 2 wiring provides the requirements for these systems. This is a great start!

700.12 General Requirements—The reorganization and expansion of this section clarifies what the rules are for the different types of emergency supply sources, recognize that the normal power source may not be the utility, add ac microgrid systems to the mix, and clarify the rules for emergency power used for fire protection, suppression, ventilation, and separation systems.

700.27 Class 2 Powered Emergency Lighting Systems—This is a new section acknowledging the advances in PoE emergency lighting. We finally have “smart” Class 2 emergency lighting systems that are revolutionizing emergency egress lighting.

Article 701—Legally Required Standby Systems

701.3 Commissioning and Maintenance—Changes to test and maintenance protocols now require legally required standby systems to be commissioned, resulting in a change to the title and text.

701.4 Capacity and Rating—Requirements were added to (B) that accommodate large transient loads when sizing legally required power sources. Other editorial revisions clarify the application of these rules, and a new subdivision provides rules for parallel power sources.

Article 702—Optional Standby Systems

702.4 Capacity and Rating—A revision to the terminology in (A) allows the rule text to match the standard for this equipment, and a new Informational Note tells us what “nonautomatic” actually means.

702.5 Interconnection or Transfer Equipment—A minor editorial revision officially adds interconnected equipment, and relocated rules made this section very user friendly.

702.12 Portable Outdoor Generators—A change in (B) no longer permits the flanged inlet for portable generators to be in your garage.

Article 705—Interconnected Electric Power Production Sources

705.6 Equipment Approval—New Informational Notes were added that may be very helpful to AHJs.

705.11 Source Connections to a Service—There was a lot of reorganization here with a few technical changes and some clarifications. Clarifications about conductor sizing, line-side connection rules, and bonding and grounding requirements are just a few of the highlights. If you work in this industry, spend some time becoming familiar with the new layout. You will love it.

705.13 Energy Management Systems (EMS)—This section has a new name and a new look, but it still covers the same applications!

705.28 Circuit Sizing and Current—There are often language barriers between trade slang and the technical terms of the *Code*. Changes in this section attempt to bridge that gap with better technical language that reflects what is understood in the field.

705.30 Overcurrent Protection—Relocated rules from 705.12 make an appearance here where they belong, generator requirements were removed, a nagging question about which side of the transformer is the primary was answered, and a general reorganization of all the rules into a list format made the whole section easier to navigate and understand.

705.82 Single 120-Volt Supply—It is not uncommon for a small stand-alone system to supply only 120V loads. When this occurs, this new rule allows the use of standard 120/240V equipment.

Article 706—Energy Storage Systems

706.7 Commissioning and Maintenance—The section title was changed to incorporate “commissioning” and new rules require ESSs to be commissioned upon installation.

706.15 Disconnecting Means—A reorganization of the section's contents and some minor editorial changes to the title and contents, make this section much more user friendly.

706.31 Overcurrent Protection—New text was added to clarify where overcurrent protection should be located for conductors connected between an ESS and another source.

Article 710—Stand-Alone Systems

710.1 Scope—The word “utility” was added to the rule text to clarify what determines when a system is a stand-alone system.

710.6 Equipment Approval—A minor editorial revision clarifies that power production equipment or systems are approved for use in “island mode.”

Article 722—Cables for Power-Limited Circuits And Fault-Managed Power Circuits

Article 722 Cables for Power-Limited Circuits and Fault-Managed Power Circuits—This article was added to combine the general requirements for all low-voltage cabling articles into one place, similar to what was done with Article 800 in 2020.

722.1 Scope—This new section provides the scope of this article.

722.3 Other Articles—Some rules from 725.3 and 760.3 were relocated here to remove some redundant rules across these sections.

722.24 Mechanical Execution of Work—Although this entire article is new, most of these rules are a modified version of those from 725.24 and 760.24.

722.179 Listing and Marking of Cables—While it might be rare for you to need to reference the listing requirements for cables, having them all in one handy little list bears a mention.

Article 724—Class 1 Power-Limited Circuits and Class 1 Power-Limited Remote-Control and Signaling Circuits

Article 724 Class 1 Power-Limited Circuits and Class 1 Power-Limited Remote-Control and Signaling Circuits—This is a new Article that covers Class 1 power-limited circuits. There are very limited applications for these rules, and in most cases those applications are mixed with nonpower-limited applications which negate most of the advantages of this article.

724.40 Class 1 Circuits—This new section outlines exactly what circuits are covered by these rules. As you can see, this is a very specialized set of rules.

Article 725—Class 2 and Class 3 Power-Limited Circuits

Article 725 Class 2 and Class 3 Power-Limited Circuits—First there were three, but now, there are two. Class 1 power-limited circuits are gone to the new Article 724, leaving only Class 2 and Class 3 power-limited circuits in Article 725!

Article 726—Class 4 Fault-managed Power Systems

Article 726 Class 4 Fault-Managed Power Systems—This new article addresses the likely future of smart power systems. The future is not here yet...but it is coming.

Article 750—Energy Management Systems

750.6 Listing—This new section requires energy management systems to be listed.

750.30 Load Management—Expanded requirements specify how an EMS should function when it is managing the load on conductors.

Article 760—Fire Alarm Systems

760.33 Supply-Side Overvoltage Protection—A new requirement for fire alarm control panels to have surge protection finally makes it into the *NEC*.

CHAPTER

8

COMMUNICATIONS SYSTEMS

Article 800—General Requirements for Communications Systems

800.3 Other Articles—A clarification indicates that the definitions in Article 100 apply to Chapter 8, and new language specifies that Chapter 8 installations must comply with 800.3(A) through (I).

800.24 Mechanical Execution of Work—Cable ties used in Chapter 8 applications are now required to be listed.

800.133 Installation of Coaxial Cables and Equipment—Although much of this looks new it is not!

800.170 Plenum Cable Ties—The cable tie listing requirements found in 805 were relocated here so they became a general requirement for Chapter 8.

Article 810—Antenna Systems

Article 810—Antenna Systems—Because of the change to the article title, we now know what this set of rules is actually about.

810.3 Other Articles—Revisions to this rule make it clear which rules apply to these installations.