Mike Holt Enterprises, Inc.

2017 NEC® INDEX

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ABOUT THE AUTHOR

Mike Holt worked his way up through the electrical trade. He began as an apprentice electrician and became one of the most recognized experts in the world as it relates to electrical power installations. He's worked as a journeyman electrician, master electrician, and electrical contractor. Mike's experience in the real world gives him a unique understanding of how the *NEC* relates to electrical installations from a practical standpoint. You'll find his writing style to be direct, nontechnical, and powerful.

Did you know Mike didn't finish high school? So if you struggled in high school or didn't finish at all, don't let it get you down. However, realizing that success depends on one's continuing pursuit of education, Mike immediately attained his GED, and ultimately attended the University of Miami's Graduate School for a Master's degree in Business Administration.

Mike resides in Central Florida, is the father of seven children, has five grandchildren, and enjoys many outside interests and activities. He's a nine-time National Barefoot Water-Ski Champion (1988, 1999, 2005–2009, 2012–2013). He's set many national records and continues to train year-round at a World competition level (www.barefootwaterskier.com).

What sets him apart from some is his commitment to living a balanced lifestyle; placing God first, family, career, then self.

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

MIKE HOLT'S 2017 *NEC* INDEX

Introduction

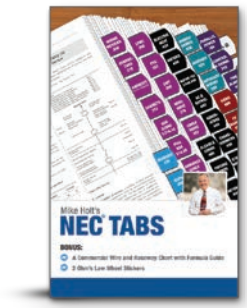
This index is a free resource from Mike Holt Enterprises. It was designed to help you find what you're looking for in the *Code* book in seconds! This index lists difficult key words and gives you the section where these words appear in the *National Electrical Code®*. It's a great tool to get you familiar with those hard to find references in the *NEC®*. Use this index along with your *Code* book and tabs (below) and you'll be in great shape!

2017 *Code* Book

Need to order a *Code* book? Choose from the softbound, the spiral or the loose leaf version. The most widely adopted element of a building code in the United States and the world, the *NEC* is the benchmark for safe and efficient electrical installations. Whether your jurisdiction adopts the 2017 *Code* immediately or down the road, you need to extend your knowledge and take advantage of the benefits right away, not months or years behind your peers in the electrical industry.

Call our office at 888.632.2633 or visit www.MikeHolt.com/Code to order your copy.

2017 Tabs



Peel-and-stick Tabs are a great way to customize your *Code* book, but too many tabs defeat the purpose. Mike Holt's adhesive tabs allow you to mark and reference important articles and tables quickly, making it easier for you to use the *NEC*. They are compatible with the *2017 Code Book and Handbook*, and can even be used on *Mike's Holt's Understanding the National Electrical Code Volumes 1 and 2* which have color-coded chapters to match the colors of the tabs.

Included in the set are 96 tabs, including 7 blank ones, a 16 in. x 20 in. Raceway and Wire Sizing Poster, and 2 Ohms Wheel Stickers.

Order at www.MikeHolt.com/Code or call 888.632.2633.

For more on this and other products, visit www.mikeholt.com/Code.

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 allied 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 electrical installations. 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 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 of all, 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 be struggling—so take one step back if you need to, and learn electrical theory. You must also understand the concepts and terms, and know grammar and punctuation in order to understand the complex structure of the rules and their intended purpose(s). Our goal for the next few pages is to give you some guidelines and suggestions on using your *Code* book to help you understand what you're trying to accomplish, and how to get there.

Language Considerations for the *NEC*

Terms and Concepts

The *NEC* contains many technical terms, so 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 the terms that are used in two or more *Code* articles; 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 the *Code* requirements for it.

Many articles have terms unique to that specific article, and the definitions of those terms are only applicable to that given article. These definitions are usually found in the beginning of the article. For example, Section 250.2 contains the definitions of terms that only apply to Article 250—Grounding and Bonding.

Small Words, Grammar, and Punctuation

It's not only the technical words that require close attention since simple words can make a big difference to the application of a rule. Was there a comma; was it "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 these words being used 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 that 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 must 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 a term 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.

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 eleven 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

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 particular 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 140 articles, each of which covers a specific subject. It begins with Article 90, the introduction to the *Code*, and contains the purpose of the *NEC*, what's covered and what isn't covered, along with how the *Code* is arranged. It also gives information on enforcement and 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—Requirements for Electrical Installations
Article 250—Grounding and Bonding
Article 300—General Requirements for Wiring Methods and Materials
Article 430—Motors and Motor Controllers
Article 500—Hazardous (Classified) Locations
Article 680—Swimming Pools, Fountains, and Similar Installations
Article 725—Remote-Control, Signaling, and Power-Limited Circuits
Article 800—Communications Circuits

4. Parts. Larger articles are subdivided into parts. Because the parts of a *Code* article aren't included in the section numbers, we have a tendency to forget what "part" an *NEC* rule is relating to. 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 located 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 located 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 subsections by letters in parentheses like (A), numbers in parentheses like (1), and lowercase letters like (a), (b), and so on, to further break the rule down to the second and third level. 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 located in Chapter 2, Article 210, Section 8, Subsection (A), Sub-subsection (1).

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 begin 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 table. Many times notes are 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 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 *Code* 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 particular 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*. The tables are used to calculate raceway sizing, conductor fill, the radius of raceway bends, and conductor voltage drop.

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

Annex A. Product Safety Standards
Annex B. Application Information for Ampacity Calculation
Annex C. Raceway Fill Tables for Conductors and Fixture Wires of the Same Size
Annex D. Examples
Annex E. Types of Construction
Annex F. Critical Operations Power Systems (COPS)
Annex G. Supervisory Control and Data Acquisition (SCADA)
Annex H. Administration and Enforcement
Annex I. Recommended Tightening Torques
Annex J. ADA Standards for Accessible Design

11. Index. The Index at the back of the *Code* book is helpful in locating a specific rule.

Author's Comment:

- Changes in the 2017 *Code* book are indicated as follows:
  - Changed rules are identified by shading the text that was changed since the previous edition.
  - 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.

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 they're looking for. On the other hand, average users should use all of 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?

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 (actually eight parts). 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 because the *NEC* is NFPA Standard Number 70.

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 located 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 the *NEC* much easier to understand and use than you originally thought.

Customizing Your *Code* Book

One way to increase your comfort level with the *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. Be aware that if you're using your *Code* book to prepare to take an exam, some exam centers don't allow markings of any type. Visit www.MikeHolt.com/tabs for more information.

Highlighting. As you read through textbooks 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.

Different Interpretations

Industry professionals often enjoy the challenge of discussing the *NEC* requirements. This discussion is important to the process of better understanding the *Code* requirements and application(s). If you decide you're going to participate in one of these discussions, don't spout out what you think without having the actual *NEC* book in your hand. The professional way of discussing a *Code* 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.

Become Involved in the *NEC* Process

The actual process of changing the *Code* takes about two years and involves hundreds of individuals making an effort to have the *NEC* as current and accurate as possible. As you study and learn how to use it, you'll find it very interesting, enjoy it more, and realize that you can also be a part of the process. Rather than sitting back and just reading it and learning it, you can participate by making proposals and being a part of its development. For the 2017 *Code*, there were 4,000 public inputs and 1,500 comments. Hundreds of updates and five new articles were added to keep the *NEC* up to date with new technologies, and pave the way to a safer and more efficient electrical future.

Let's review how this process works:

STEP 1—Public Input Stage

Public Input. The revision cycle begins with the acceptance of Public Input (PI): 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: 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.

Author's Comment:

- Proposals and comments can be submitted online at the NFPA website at www.nfpa.org/doc# (for NFPA 70, go to www.nfpa.org/70 for example). From the homepage, look for "Codes & Standards," then find "How the Process Works." If you'd like to see something changed in the *Code*, you're encouraged to participate in the process.

2017 INDEX

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"…as for me and my house, we will serve the Lord." [Joshua 24:15]