

# National Electrical Safety Code® Manual of Style

## Introduction

The National Electrical Safety Code (NESC) is also known as American National Standard C2. It is a consensus standard that has been prepared by the National Electrical Safety Code Committee under procedures approved by the American National Standards Institute (ANSI). The membership of the NESC Committee is composed of national organizations and is certified by ANSI as having an appropriate balance of the interests of the public, utility workers, regulatory agencies, and the various types of private and public utilities. Utility regulators in the US and more than 100 nations use the Code at least in part.

The NESC sets the ground rules for practical safeguarding of persons during the installation, operation, and maintenance of electric supply and communications equipment.

The goal of this style manual is to help improve the content and clarify the NESC for print, PDF, and mobile products by documenting structure, style requirements, and editorial guidelines.

Parts of the manual were reproduced or modified from the *2014 IEEE Standards Style Manual*.

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# National Electrical Safety Code<sup>®</sup>

## Manual of Style

### 1. Overview

The goal of this style manual is to help improve the content and clarify the National Electrical Safety Code (NESC) for print, PDF, and mobile products by documenting structure, style requirements, and editorial guidelines.

This manual serves as a reference for individuals submitting change proposals for the NESC and NESC committees revising existing text and drafting new text.

### 2. Normative references

American Mathematical Society, Mathematics into Type.<sup>1</sup>

ANSI/IEEE Std 260.3<sup>TM</sup>, American National Standard for Mathematical Signs and Symbols for Use in Physical Sciences and Technology.<sup>2</sup>

ANSI Y32.9, American National Standard Graphic Symbols for Electrical Wiring and Layout Diagrams Used in Architecture and Building Construction.<sup>3</sup>

IEC 60050, IEC International Electrotechnical Vocabulary.<sup>4</sup>

IEEE/ASTM SI 10, American National Standard for Metric Practice.

*IEEE Standards Dictionary Online.*

IEEE Std 260.1<sup>TM</sup>, IEEE Standard Letter Symbols for Units of Measurement (SI Units, Customary Inch-Pound Units, and Certain Other Units).<sup>5</sup>

IEEE Std 315<sup>TM</sup>, IEEE Standard Graphic Symbols for Electrical and Electronics Diagrams (Including Reference Designation Letters).

IEEE Std 945<sup>TM</sup>, IEEE Recommended Practice for Preferred Metric Units for Use in Electrical and Electronics Science and Technology.

*Merriam-Webster's New Collegiate Dictionary.* Springfield, MA: Merriam-Webster, Inc.

*The Chicago Manual of Style.* Chicago, IL: The University of Chicago Press.

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<sup>1</sup> Available at <https://www.ams.org/publications/authors/mit-2.pdf>.

<sup>2</sup> ANSI/IEEE standards are available through The Institute of Electrical and Electronics Engineers, Inc. (<http://standards.ieee.org/>).

<sup>3</sup> ANSI standards are available from the American National Standards Institute (<http://www.ansi.org/>).

<sup>4</sup> IEC publications are available from the International Electrotechnical Commission (<http://www.iec.ch>) and the American National Standards Institute (<http://www.ansi.org/>).

<sup>5</sup> IEEE standards are available through The Institute of Electrical and Electronics Engineers, Inc. (<http://standards.ieee.org/>).

### **3. Normative versus informative elements**

The following normative elements of the Code contain information that is mandatory or necessary to implement the Code:

- Body (parts, sections, and rules) including
    - ExceptionsNOTE 1—See Rule 015D of the 2017 Code.
  - Figures and tables
  - Footnotes to tables
- NOTE 2—See Rule 015C of the 2017 Code.
- Footnotes to figures

The following informative elements contain information that is not mandatory when implementing the Code:

- Front matter
  - Recommendations
- NOTE 3—See Rule 015E of the 2017 Code.
- Notes and examples to rules
- NOTE 4—See Rule 015F of the 2017 Code.
- Notes to figures and tables
  - Appendixes

## **4. Structure of the NESC**

### **4.1 Front matter**

The front matter of the Code includes

- Boilerplate text (abstract, keywords, Foreword, Contents, etc.)
- Specific committee and subcommittee information (membership, NESC procedures, revision schedule, working group assignments for the next revision)
- Letter symbols for units

### **4.2 Parts, sections, and rules**

The NESC is organized by parts, sections, and rules.

#### **4.2.1 Parts and sections**

There are four general sections at the beginning of the Code. Following the general sections, there are four main parts of the Code. The parts are divided into additional sections, as shown in Table 1.

**Table 1—Structure of the parts and sections of the 2017 NESC**

Part no.	Part title	Section
—		1. Introduction to the NESC
		2. Definitions of special terms
		3. References
		9. Grounding
1.	Safety Rules for the Installation and Maintenance of Electric Supply Stations and Equipment	10. Purpose and scope of rules
		11. Protective arrangements in electric supply stations
		12. Installation and maintenance of equipment
		13. Rotating equipment
		14. Storage batteries
		15. Transformers and regulators
		16. Conductors
		17. Circuit breakers, reclosers, switches, and fuses
		18. Switchgear and metal-enclosed bus
2.	Safety Rules for the Installation and Maintenance of Overhead Electric Supply and Communication Lines	19. Surge arresters
		20. Purpose, scope, and application of rules
		21. General requirements
		22. Relations between various classes of lines and equipment
		23. Clearances
		24. Grades of construction
		25. Loadings for Grades B and C
3.	Safety rules for the Installation and Maintenance of Underground Electric Supply and Communication Lines	26. Strength requirements
		27. Line insulation
		30. Purpose, scope, and application of rules
		31. General requirements applying to underground lines
		32. Underground conduit systems
		33. Supply cable
		34. Cable in underground structures
		35. Direct-buried cable and cable in duct not part of a conduit system
4.	Work rules for the Operation of Electric Supply and Communications Lines and Equipment	36. Risers
		37. Supply cable terminations
		38. Equipment
		39. Installation in tunnels
		40. Purpose and scope
		41. Supply and communications systems—Rules for employers
		42. General rules for employees
43. Additional rules for communications employees		
		44. Additional rules for supply employees

## 4.2.2 Rules

### 4.2.2.1 General

Rules are a three-digit string (possibly starting with 0). Rules fall in the hierarchy between sections defined in 4.2.1 and Level 1 defined in 4.2.2.2. In addition, any division of a Rule (see 4.2.2.2) is also referred to as a rule.

### 4.2.2.2 Division of rules

Sections may be divided by rules, and rules may be subdivided for clarity of content and to aid in the use of cross-references. Rules should be divided further only when there will be more than one subdivision.

For each rule, there may be up to six levels of subdivision.

Level 1	A., B., C., etc.
Level 2	1., 2., 3., etc.
Level 3	a., b., c., etc.
Level 4	(1), (2), (3), etc.
Level 5	(a), (b), (c), etc.
Level 6	i, ii, iii, etc.

When headings for levels 1, 3, and 5 require a double letter to identify because the 26 letters of the alphabet have already been used, the following lettering sequence shall be utilized: AA., BB., CC., aa., bb., cc., (aa), (bb), (cc), etc.

To aid in the creation of a useable table of contents, rules that are divided at levels 1 and 2 must have concise titles and not be complete sentences.

#### 4.2.2.3 Exceptions to rules

Exceptions are defined in Rule 015D of the 2017 Code.

In text, they are introduced by the relevant word, e.g., *EXCEPTION*, in italicized uppercase letters and a colon. For two or more consecutive exceptions, each is subdivided according to 4.2.2.2. See the examples of *EXCEPTIONS* in Figure 1.

a. Driven rods

(1) Driven rods may be sectional; the total length shall be not less than 2.45 m (8 ft). Iron, zinc-coated steel, or steel rods shall have a diameter of not less than 15.87 mm (0.625 in). Copper-clad, stainless steel, or stainless steel-clad rods shall have a diameter of not less than 12.7 mm (0.5 in).

(2) Longer rods or multiple rods may be used to reduce the ground resistance. Spacing between multiple rods should be not less than 1.8 m (6 ft).

*EXCEPTION:* Other diameters or configurations may be used if their suitability is supported by a qualified engineering study.

(3) Driven depth shall be not less than 2.45 m (8 ft). The upper end shall be flush with or below the ground level unless suitably protected.

*EXCEPTION 1:* Where rock bottom is encountered, driven depth may be less than 2.45 m (8 ft), or other types of electrode may be employed.

*EXCEPTION 2:* When contained within pad-mounted equipment, vaults, manholes, or similar enclosures, the driven depth may be reduced to 2.29 m (7.5 ft).

**Figure 1—Example of exceptions from Rule 094B2a from the 2017 Code**

#### 4.3 Back matter

The NESC may contain informative appendixes, including a bibliography and an index.

## 5. Style

### 5.1 General

Consult *The Chicago Manual of Style* for editorial style not outlined in this manual.

### 5.2 Capitalization

The initial letter of the first word should be capitalized in the following:

- Section headings
- Rules
- Appendix headings
- Titles of figures
- Titles of tables
- Column and row headings in tables

### 5.3 Numbers

The following rules should be observed:

- a) Spell out numbers that are less than 10.
- a) Use numerals for 10 and above or numbers under 10 grouped with numbers 10 and above.
- b) Spell out numbers 10 and above at the beginning of a sentence. Consider rewriting the sentence to avoid starting with a number.
- c) For numbers of magnitude less than one, a zero should be placed in front of the decimal point.
- d) Use a non-breaking space in place of a comma for numbers that are greater than or equal to 10,000.
- e) The value of a quantity shall be expressed by an Arabic numeral followed by a non-breaking space and the appropriate unit name or symbol.
- f) If tolerances are provided, the unit shall be given with both the basic value and the tolerance (150 m ± 5 mm). Ranges should repeat the unit (e.g., 115 V to 125 V). Dashes should never be used because they can be misconstrued for subtraction signs.

### 5.4 Units of measure

#### 5.4.1 Metric and customary

Per Rule 017 of the 2017 Code, numerical values in the requirements of this Code are stated in the metric system and in the customary inch-foot-pound system. In text, the metric value is shown first with the customary inch-foot-pound (inside parentheses) following. Extensive detailed tables are duplicated.

#### 5.4.2 Letter symbols

In the Code, letter symbols should be used rather than abbreviations. Letter symbols include symbols for physical quantities (quantity symbols) and symbols for the units in which those quantities are measured (unit symbols). Unlike common abbreviations, letter symbols are invariant in singular and plural, they are not followed by a period, and case is maintained independent of the surrounding text (see IEEE Std 260.1).

## 5.5 Recommendations, notes, and examples

Recommendations, notes, and examples are defined by Rules 015E and 015F of the 2017 Code.

In text, they are introduced by the relevant word, e.g., *EXCEPTION*, in italicized uppercase letters and a colon. For two or more consecutive recommendations, notes, or examples, each is numbered starting with Arabic numeral 1 for that particular rule or subdivided rule.

Per Rule 015G of the 2017 Code, a recommendation, exception, or note applies to the preceding text within the subdivided rule. (See 4.2.2.2 for the six levels in the division of rules.)

## 5.6 Special terms

Special terms are listed in Section 2 in alphabetical order and introduced by the following paragraph:

The following definitions are for use with the National Electrical Safety Code. For other use, and for definitions not contained herein, the *IEEE Standards Dictionary Online* should be referenced. If a term is not specifically defined in the *IEEE Standards Dictionary Online*, consult *Merriam-Webster's New Collegiate Dictionary*.

Each special term and its definition shall be considered a standalone item, and acronyms and abbreviations shall be spelled out unless the term is used at least twice in the definition.

Each definition should be a brief, self-contained description of the term in question and shall not contain any other information, such as requirements or elaborative text. The term should not be used in its own definition. The definition should follow the special term as a sentence preceded by a period.

A main definition can be further divided into related terms, starting with level 2. (See 4.2.2.2 for the division of rules.)

Cross-references should occur after the definition and may consist of the following classes, in the order shown:

- Contrast: Refers to a term with an opposite or substantially different meaning.
- Syn: Refers to a synonymous term.
- See: Refers to a term where the desired definition can be found.
- See also: Refers to a related term.

The cross-referenced terms associated with these classes should be in alphabetical order, in bold type, and separated by semicolons when there is more than one.

Figures may be part of definitions and numbered consecutively, starting with “Figure D-1.”

## 5.7 References

### 5.7.1 Normative

References are listed in Section 3 in alphanumeric order and introduced by the following paragraph:

The following standards form a part of the NESC to the extent indicated in the rules herein.

Cross-references to citations are given in parentheses following the normative reference.



## 5.7.2 Informative

References that are provided for information only are listed in the informative appendix and introduced by the following paragraph:

Bibliographical references are resources that provide additional or helpful material but do not need to be understood or used to implement this standard. Reference to these resources is made for informational use only.

Cross-references to citations are given in parentheses following the informative reference.

## 5.8 Figures

### 5.8.1 Requirements for creating figures

For specific requirements concerning the preparation of figures, see Table 2.

Figures should be saved as either TIF or EPS files. It is preferable to also supply the source file (e.g., MS Visio) from the graphics program along with the TIF or EPS file.

**Table 2—Figure preparation and requirements**

Resolution	<ul style="list-style-type: none"><li>— Black and white: 300 DPI</li><li>— Grayscale: 150 DPI</li><li>— Line art: 600 DPI</li><li>— Black and white photograph: 300 DPI</li></ul>
Size	<ul style="list-style-type: none"><li>— Maximum width: 7.5 in</li><li>— Maximum length: 10 in</li></ul>
Color	Color in figures shall not be required for proper interpretation of the information.
Line drawings	Save line art as black and white.
Line drawings with shaded areas	Save line drawings with shaded areas as grayscale.
Line weight	Lines should be of an adequate thickness, at least 0.5 point to 1.0 point.
Photographs	Save photographs as grayscale
Fonts in graphics	<ul style="list-style-type: none"><li>— All fonts shall be embedded into the figure.</li><li>— Use Times New Roman and Arial fonts.</li><li>— Letter symbols not normally capitalized should be lowercase.</li></ul>
Point size	The IEEE Standards Department prefers the use of 10-point type size. In no case should captions be in a font smaller than 8 points.
Cropping	<ul style="list-style-type: none"><li>— There should be no borders around the graphic.</li><li>— Remove any excess white space around the image edges.</li></ul>
Original art	Whenever possible, original source files (from the graphics programs used) should also be submitted to the IEEE.
Permissions	Working groups shall obtain permission to use any figure taken from another source, including from a manufacturer, prior to using it in the Code.
Naming graphic files	NESC-2022_figD-1, NESC-2022_fig110-1

## 5.8.2 Figure numbering and titles

Figures shall be numbered consecutively, preceded by the rule number, and in the order of their reference in the text (Figure 110-1, Figure 110-2, etc.). Figures must have title captions.

Figures included in annexes should carry the identifying letter of the annex in which they appear, followed by a hyphen. For example, the first figure in Annex A should be identified as Figure A-1.

All numbered figures must be referenced in the text. A figure should be referenced by the word *Figure* and its number only (e.g., “see Figure 110-1”). If referring to two or more figures in the same sentence, each should be named separately. For example, use “see Figure 1, Figure 2, and Figure 3,” instead of “see Figures 1 through 3.”

Only the initial letter of the first word and proper nouns should be capitalized in figure titles.

## 5.9 Tables

### 5.9.1 Numbering and capitalization

Tables should be numbered consecutively, preceded by the rule number, and in the order of their reference in the text (Table 110-1, Table 110-2, etc.).

Tables included in annexes should carry the identifying letter of the annex in which they appear, followed by a hyphen. For example, the first table in Annex A should be identified as Table A-1.

All numbered tables must have titles and be referenced in the text. A table should be referenced in the text by the word *Table* and its number only (e.g., “see Table 110-1”). If referring to two or more tables in the same sentence, each should be named separately. For example, use “see Table 11-01, Table 110-2, and Table 110-3,” instead of “see Tables 110-1 through 110-3.”

### 5.9.2 Presentation of data and table format

Tables should be boxed and ruled. Whenever possible, tables should be organized to fit on a single page. When a table must carry over for more than one page, complete column headings should be repeated at the top of successive pages. The table number and title should be repeated at the top of the page as follows: “Table 110-1—Title (*continued*).”

Units of measure shall always be provided either in the title or the column headings. To save space, abbreviations and letter symbols should be used in column and line headings wherever possible. (See IEEE Std 260.1 and other standards in Section 2 for the appropriate abbreviations and symbols.)

An em dash (—) should be used to indicate the lack of data for a particular cell in a table.

### 5.9.3 Notes and footnotes to tables

A note to a table is informative. A footnote to a table is normative. Important information on safety, health, or the environment shall not be included in notes to tables.

Footnotes to a table are designated by a circle surrounding the footnote number. Footnotes are numbered consecutively and have the same force and effect that is required or allowed by the rule that specifies the use of the table.

If a footnote is cited more than once, each additional citation should refer back to its first mention.

## 5.10 Mathematical expressions

### 5.10.1 Presentation of equations

A multiplication sign ( $\times$ ), rather than the letter “x” or a multidot ( $\cdot$ ), should be used to indicate multiplication of numbers and numerical values, including those values with units (e.g., 3 cm  $\times$  4 cm).

Although the stacked style of fractions is preferred, exceptions should be made in text to avoid printing more than two lines of type. For example, in text  $a/b$  is preferable to  $\frac{a}{b}$ .

### 5.10.2 Numbering of equations

Equations should be numbered consecutively in parentheses at the right margin and cited in the text by the word Equation and its number only [e.g., “see Equation (1)”]. If referring to two or more equations in the same sentence, each should be named separately. For example, use “see Equation (1), Equation (2), and Equation (3),” instead of “see Equations (1) through (3).”

Equations in annexes should be numbered beginning with the letter of the appendix where they are found. For example, the first equation in Appendix A would be numbered “(A-1)” and the reference to it would be to “see Equation (A-1).”

### 5.10.3 Variable lists

All terms shall be defined, including both quantities and units, in a tabulation following the equation. The list should be preceded by the word *where*, followed by the list of variables and corresponding definitions.

## 5.11 Acronyms and abbreviations

Abbreviations and acronyms should be spelled out at first use in the front matter, the body, and the appendixes. The abbreviation and acronym is given in the parentheses after the term.

## 5.12 Appendixes

Consecutive capital letters and a title should be used to identify each appendix.

## 6. Editorial guidelines

### 6.1 *Shall and should*

See Rule 015A and Rule 015B.

### 6.2 Use of the first- or second-person forms of address

The first-person form of address (*I, we*) or the second-person form of address (*you*) should not be used or implied in standards, e.g., “*You should measure the wires.*” This sentence should be rewritten to identify the addressee, as follows: “*Employees should measure the wires.*”

## **Annex A**

(informative)

### **Sample IEEE Permission Form Request and Response Letters**

When previously published material is to be reprinted or modified for use in the NESC, permission to use that material is required. Clear, written permission from the copyright holder is needed as early as possible in the process.

Sample permission request and response letters are required to reprint or modify copyrighted material. The request letter is completed by the requestor, and the second letter is to be completed by the copyright holder.

Letter templates are available for download at: <http://standards.ieee.org/develop/stdsreview.html>

NOTE—See Related Links > IEEE-SA Standards Copyright Permission Request Letter Template (.zip)