

# UPCOMING 2023 NATIONAL ELECTRICAL SAFETY CODE (NEC). A BRIEF OVERVIEW OF MAIN EXPECTED CHANGES.

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June 2022

# AGENDA

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- ❖ The NESC Structure
- ❖ Key dates
- ❖ NESC General overview
- ❖ Revisions for 2023
- ❖ Features and benefits to NESC stakeholders
- ❖ Follow up resources and links

# THE NESC STRUCTURE

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SC1- Coordination -  
Sections 1, 2 and  
3; Coordination  
between technical  
subcommittees

SC2- Grounding  
Methods - Section  
9

SC3- Electric  
Supply Stations -  
Sections 10-19

SC4- Overhead  
Lines - Clearances -  
Section 20-23

SC5- Overhead  
Lines - Strength  
and Loading -  
Sections 24-27

SC7- Underground  
Lines - Sections  
30-39

SC8- Work Rules -  
Sections 40-43

# KEY DATES

1 May 2022

1 Aug 2022

1 Jan 2023

1 Feb 2023

Pre-Sale Period  
Begins

Code & Handbook  
Published in IEEE  
*Xplore*

Code becomes  
available in IEEE  
*Xplore*

Course Program  
becomes available

NESC Included in  
Subscription  
Packages

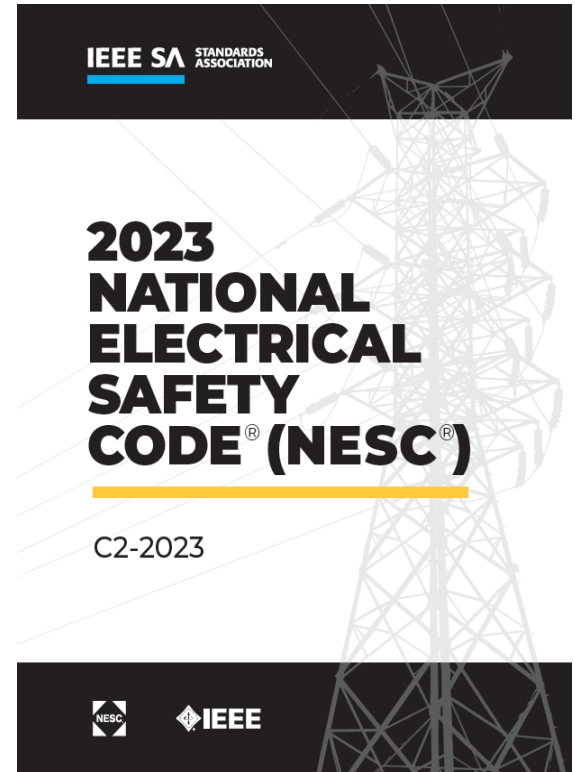
IEL, ISOL All, and ISOL  
P&E will include the  
2023 NESC

NESC Goes into Effect  
The 2023 Version of  
the Code goes into  
effect

# NESC 2023 EDITION - OVERVIEW

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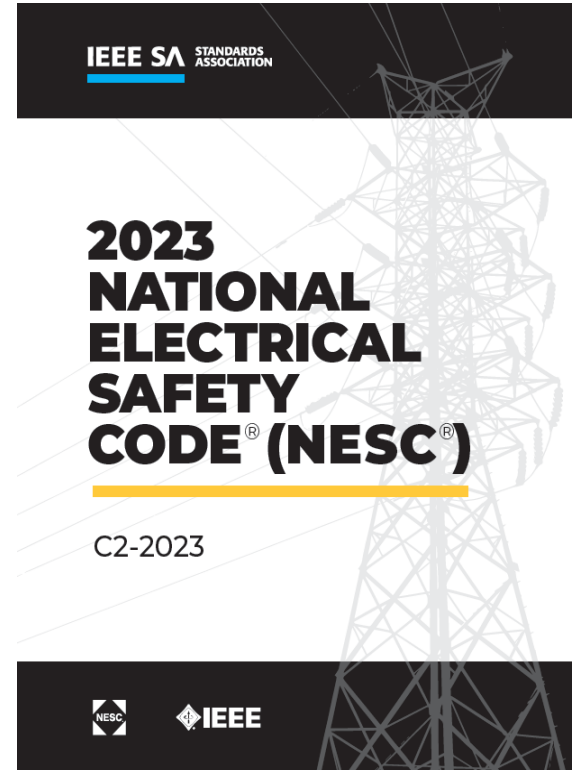
- ❖ The NESC is revised every 5 years.
- ❖ The NESC is an authoritative source on best practices and has been for over 100 years.
- ❖ The 2023 edition contains extensive updates and critical revisions that directly impact the power utility industry.
- ❖ It contains the basic provisions that are considered necessary for the safety of employees and the public under the specified conditions.



# NESC 2023 EDITION - OVERVIEW

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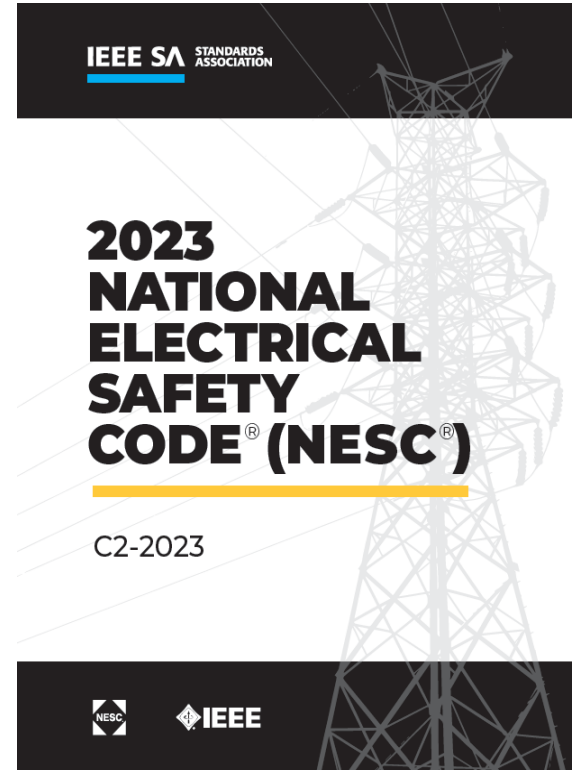
- ❖ The Code covers basic provisions for safeguarding of persons from hazards arising from the installation, operation, or maintenance of conductors and equipment.
- ❖ The Code also includes work rules for the construction, maintenance, and operation of electric supply and communication lines and equipment.



# NESC 2023 EDITION - OVERVIEW

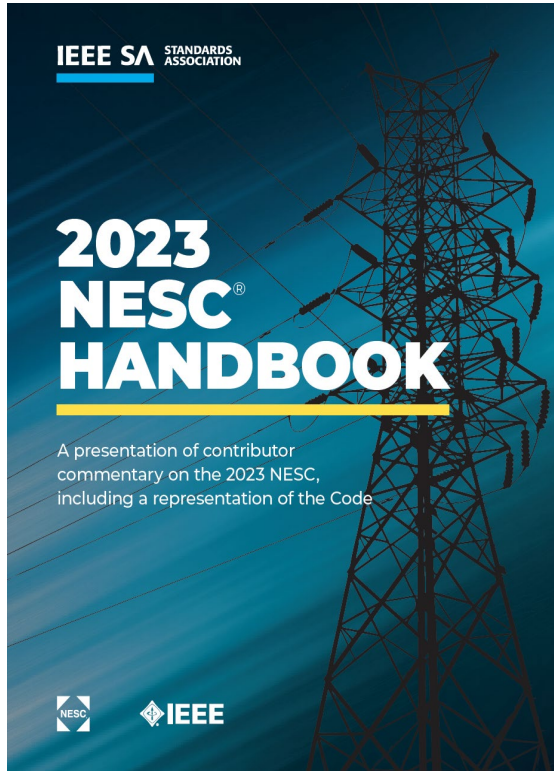
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- ❖ The standard is applicable to the systems and equipment operated by utilities, or similar systems and equipment, of an industrial establishment or complex under the control of qualified persons.
- ❖ The NESC provides guidance and rules for specific situations such as the effective grounding of circuits and minimum safe clearances.



# THE NESC HANDBOOK

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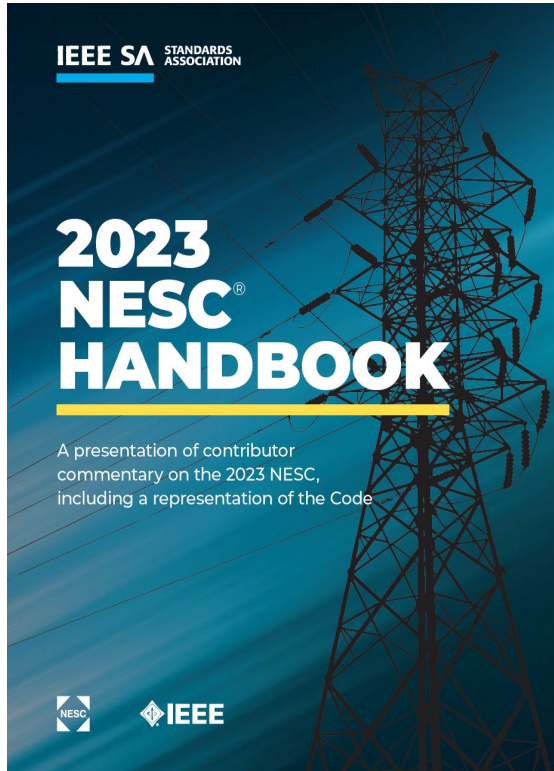


- ❖ The 2023 NESC Handbook represents a next-generation tool for the professional who needs to understand the NESC.
- ❖ The handbook was developed for use at many levels in the electric and communication industries, including those involved in system design, construction, maintenance, inspection, standards development and worker training.



# THE NESC HANDBOOK

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- ❖ This Handbook gives users insight into what lies behind the NESC's rules and how to apply them.
- ❖ Note that the 2023 NESC Handbook will not be translated into Spanish or Chinese at this time, but the 2017 version is still available.

# THE NESC ELEARNING COURSE PROGRAM

- ❖ 7 online courses.
- ❖ Courses are self-paced and delivered in a convenient, easy-to-use online learning environment.



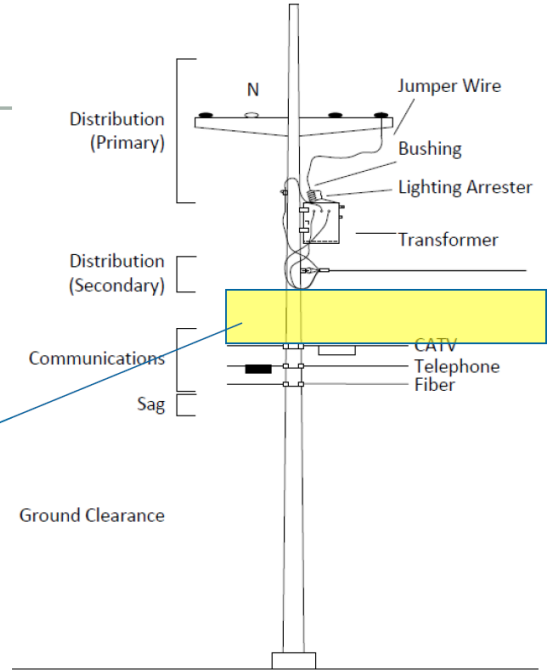
# VALUE ADDED CONTENT (I.E. ELEARNINGS)

## SECTION 2: DEFINITIONS COMMUNICATION WORKER SAFETY SPACE

- Digitized Drawings
- SMEs direct contact
- Learning Lessons

- The space on joint-use structures where communication facilities are separated from the supply space by the **communication worker safety zone**.

Communication Worker Safety Zone



# VALUE ADDED CONTENT (I.E. REDLINE VERSIONS)

Standard requirements  
Plus highlighted changed  
compared to previous  
edition

Added Value

**IEEE SA**  
STANDARDS  
ASSOCIATION

IEEE Standard for Information Technology—  
Telecommunications and Information Exchange between Systems  
Local and Metropolitan Area Networks—  
Specific Requirements

**Part 11: Wireless LAN Medium Access Control  
(MAC) and Physical Layer (PHY) Specifications**

IEEE Computer Society

Developed by the  
LAN/WAN Standards Committee

**STANDARDS**

**REDLINE**  
Shows changes from the  
previous version!

IEEE Std 802.11™-2020  
Revision of IEEE Std 802.11-2016

IEEE

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In order to set up a security association to a peer STA, a STA that does not have the security policy of the peer should send a Probe Request frame to the peer STA to find the security policy before setting up a security association to the peer STA.

In order to set up a security association to a peer STA, a STA that received a 4-way handshake but does not know the security policy of the peer should send a Probe Request frame to the peer STA to find the security policy before setting up a security association to the peer STA.

**12.A.1.1.2 PMKSA**

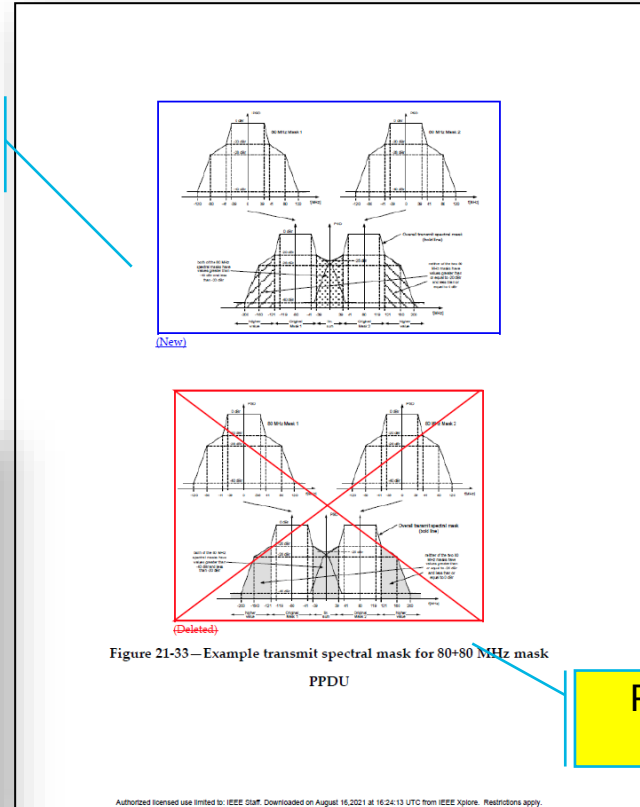
The PMKSA is created by the Authentication (802.11E) and Reauthentication (802.11I) when RAP authentication (802.11R) authentication, or PSK authentication, completes successfully, as when the PSK is confirmed. When the negotiated ANCI uses PMK256 derivation, with XCC, as a parameter as defined in 12.11.3, the PMK256 is derived from the XCC. During the initial 4-way handshake a not change during the subsequent PMKSA.

When the PMKSA is the result of a successful IEEE 802.11R authentication, it is derived from the RAP authentication not authentication parameters provided by the peer STA. When the PMKSA is the result of a successful GAK authentication, it is generated as a result of the successful completion of the 4-Way exchange. This security association is bidirectional. In other words, both parties use the information in the security association for both sending and receiving. The PMKSA is shared between the peer STA and the AP authentication request frame transmitted to the AP or reauthentication frame transmitted from the peer STA to the AP. The PMKSA is shared between the peer STA and the AP authentication request frame transmitted to the AP or reauthentication frame transmitted from the peer STA to the AP. The PMKSA is shared between the peer STA and the AP authentication request frame transmitted to the AP or reauthentication frame transmitted from the peer STA to the AP.

PMKSA is defined in 12.11.3.3 (12.11.3.3). The PMK256 identifies the security association.

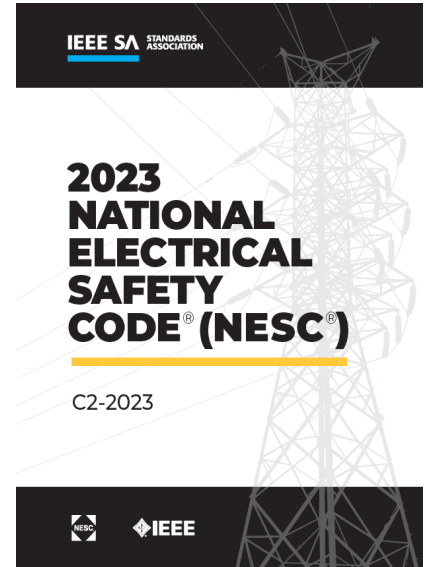
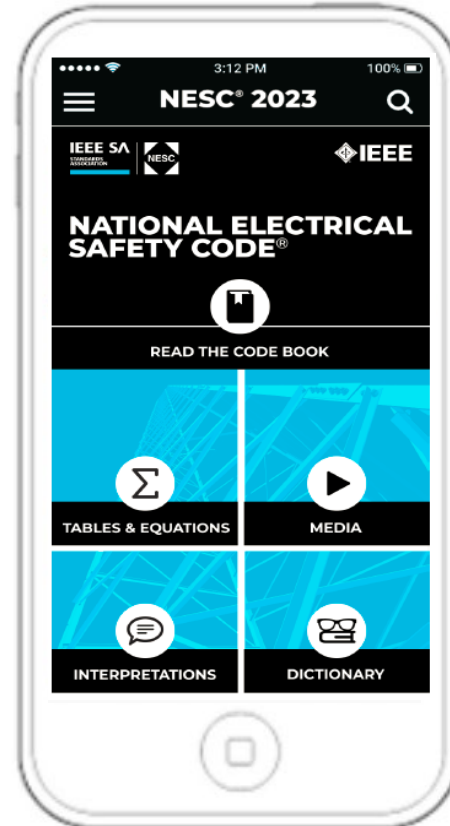
- Authentication to peer's MAC address for multi-band BSSA. The MAC address is associated with the operating band in use when the PMKSA is established.

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# VALUE ADDED CONTENT (I.E. MOBILE APPS)

- NESC's Mobile App (2017ed & 2023ed)
- Tables & Equations
- Link to Interpretations webpage
- Free Access to Online Dictionary
- Video recordings of SMEs and Workshops



# WEB SUPPORT/CONTENT/GUIDANCE/RESOURCES

The image shows a presentation slide on the left and browser windows on the right. The slide, titled "WEB SUPPORT/CONTENT/GUIDANCE/RESOURCES", lists the following resources:

- IEEE Xplore digital Library  
<https://ieeexplore.ieee.org/browse/standards/collection/ieee>
- Reading room  
<https://ieeexplore.ieee.org/browse/standards/reading-room/page>
- IEEE GET Program™  
<https://ieeexplore.ieee.org/browse/standards/get-program/page>
- IEEE Standards Dictionary

The slide also features the IEEE Xplore Digital Library logo and a small image of people working. The browser windows on the right show the IEEE Xplore website and the NFPA 72 National Fire Alarm and Signaling Code 2019 page.

## International Standards – Links – References

[nfpa.org/72](https://www.nfpa.org/72) ... ICC Codes & Stds ... IEC Stds ... IEEE ... UL ... FM Global ... and more...

# MAJOR REVISIONS TO THE 2023 EDITION

IEEE SA STANDARDS ASSOCIATION

## 2023 NATIONAL ELECTRICAL SAFETY CODE® (NESC®)

C2-2023

IEEE SA STANDARDS ASSOCIATION



IEEE

IEEE SA STANDARDS ASSOCIATION



THE NATIONAL ELECTRIC SAFETY CODE

## SAFETY IN NUMBERS

### NESC 2023 SETTING THE GROUND RULES

The 2023 edition of the NESC continues to provide guidance for the practical safeguarding of persons and utility facilities during the installation, operation, and maintenance of electric supply and communication facilities. Here are some of the highlights:

#### RULES 190-195

New rules for Photovoltaic (PV) generating stations

#### RULE 116c

Adds EXCEPTION for providing short-circuit protection if < 1000 V and short lengths of insulated power cables.

#### RULE 320B

Revised to clarify separations apply to communications and supply in different conduit systems.

#### TABLE 410-4

Adds new Table based on latest Arc-Flash testing on live-front transformers.

#### RULE 092A

Exception added allowing protection, control, safety battery systems to not be grounded.

#### RULES 224 B1, C1, D1

Revised to better present horizontal wind clearances, and coordinate requirements with new Table 234-7.

#### RULE 120A

Revised, now provides correction factors for clearances on higher elevations.

#### TABLE 253-1

Revised to reduce Load Factor for fiber-reinforced polymer components under wire tension, including dead ends, for Grade C construction.

#### RULE 410A

Revised to require a specific radio-frequency safety program for exposed employees.

THE 2023 NESC  
AVAILABLE ON 1 AUGUST, 2022



IEEE

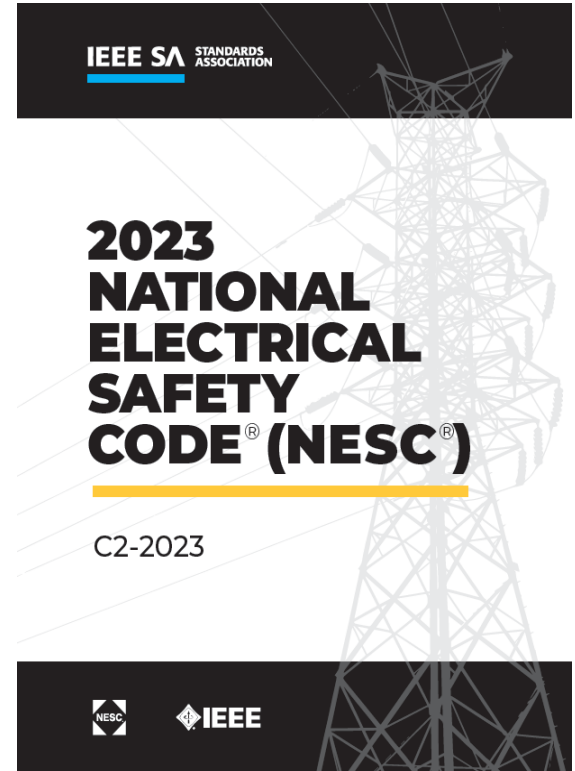
# MAJOR REVISIONS TO THE 2023 EDITION

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## Part 1. Safety Rules for Electric Supply Stations

Rule 110.A.3 – Revised. Adds exception to required grounding if qualified study shows no safety issue.

Rule 124.A – Revised. Now provides correction factors for clearances for higher elevations.



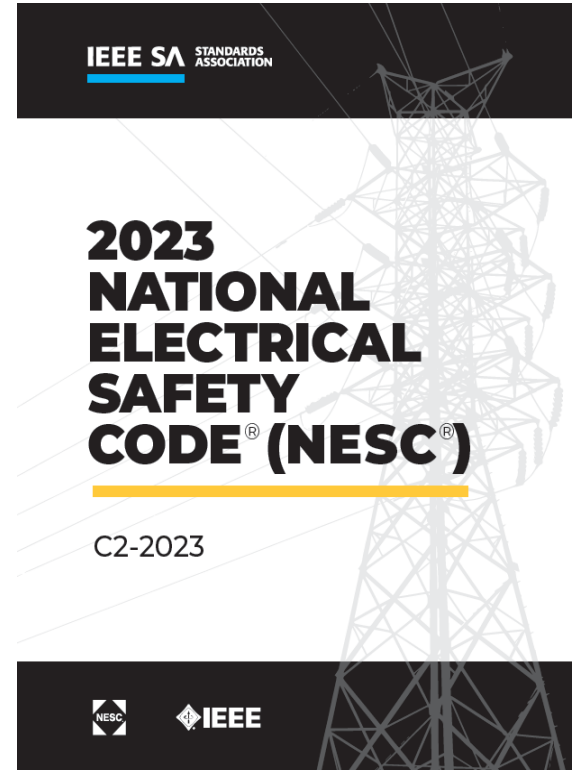


# MAJOR REVISIONS TO THE 2023 EDITION

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## Part 1. Safety Rules for Electric Supply Stations

Rule 124.C – Revised. Reduces threshold from 2500 V to 2000V for requiring shielded conductors and re-writes Exception allowing non shielded conductors when insulated for 5000 V.



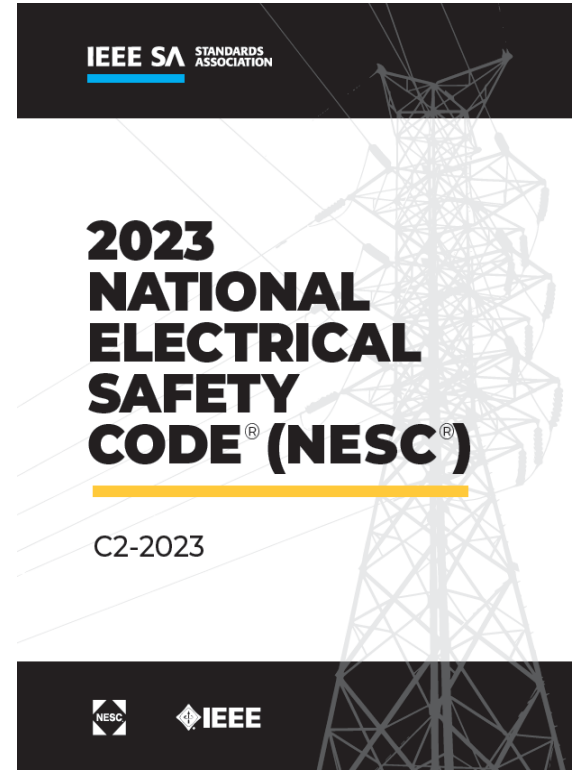
# MAJOR REVISIONS TO THE 2023 EDITION

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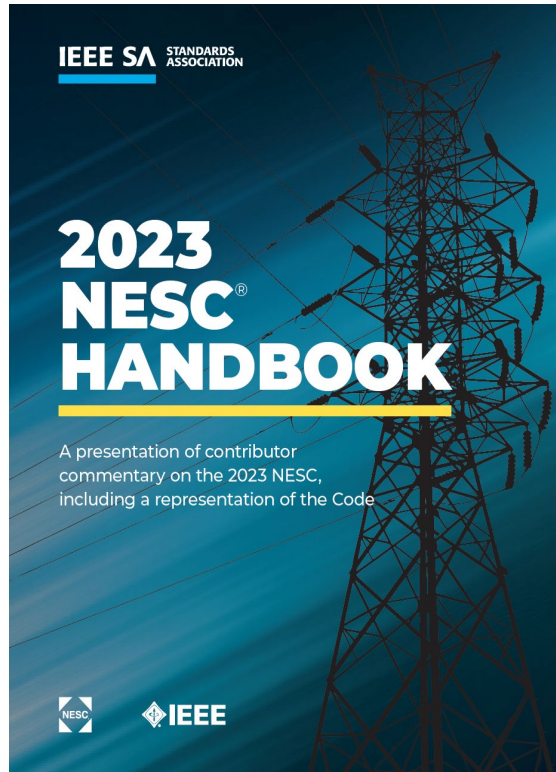
## Part 1. Safety Rules for Electric Supply Stations

Section 14 – Revised. Rewrite section to recognize new battery technologies, applications and hazards.

New content includes General Battery, Substation and Plant Batteries, and Grid Storage Batteries.



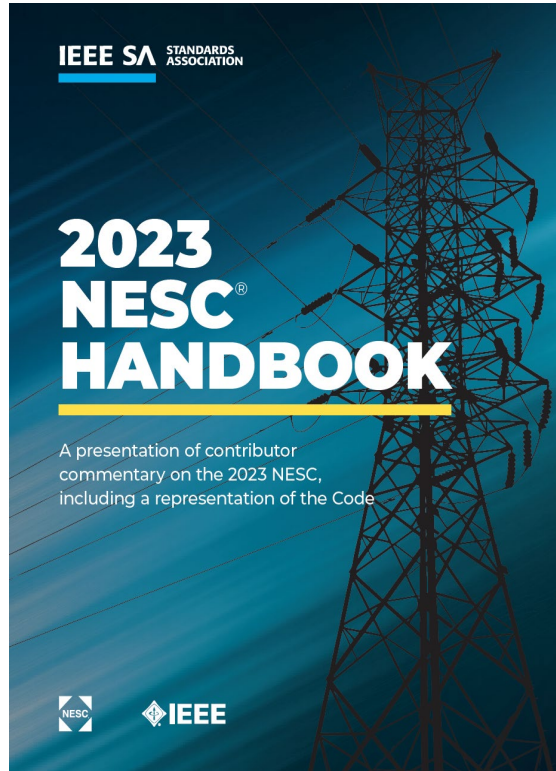
# MAJOR REVISIONS TO THE 2023 EDITION



## Part 2. Safety Rules for Overhead Lines—Clearances

Rule 215.D – Revised. Bonding of supply and communication systems on the same supporting structure. Multiple supply neutrals shall be bonded together. On non-metallic structures the supply neutral and communication messenger shall be bonded together. On metallic structures the supply neutral and communication messenger shall be bonded to the structure.

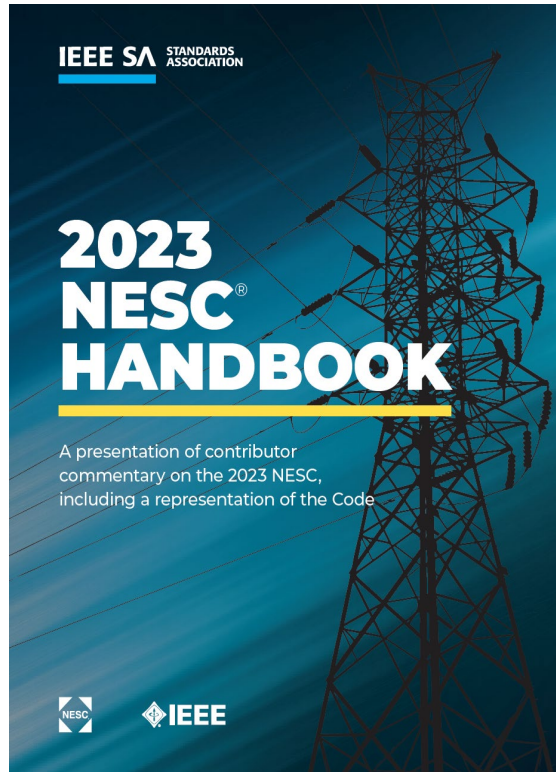
# MAJOR REVISIONS TO THE 2023 EDITION



## Part 2. Safety Rules for Overhead Lines—Clearances

Rule 217.A.2.c – Revised. Clarified the required separation of riser brackets and equipment attached to the structure such that a structure is not readily climbable.

# MAJOR REVISIONS TO THE 2023 EDITION



## Part 2. Safety Rules for Overhead Lines—Clearances

Rule 217.C.1 – Revised. Protection and marking of guys. The ground end of each anchor guys adjacent to regularly traveled pedestrian thoroughfares, or places where persons are normally encountered or reasonably anticipated, exposed to pedestrian traffic shall be provided with a substantial and conspicuous marker.

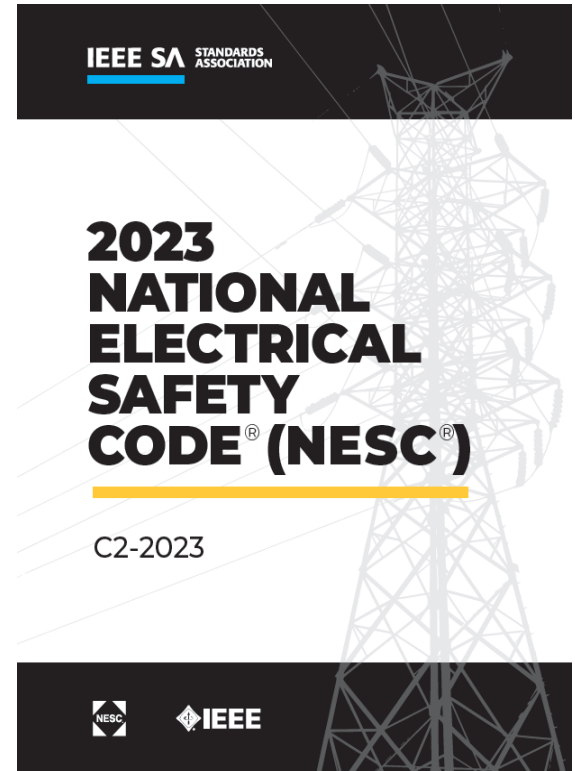
# MAJOR REVISIONS TO THE 2023 EDITION

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## Part 3. Safety Rules for Underground Lines

Rule 311.C – Revised. Clarified and simplified Emergency Installations.

Rule 323.D.4 – Added. New rule requires that “Covers and gratings should be designed to limit the likelihood of tripping by pedestrians”.



# MAJOR REVISIONS TO THE 2023 EDITION

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## Part 3. Safety Rules for Underground Lines

Section 39 – Revised. Consolidated Rules regarding Installations in Tunnels.

Rule 311.C – Revised. Modifications to Rule 311.C intended to address: How to protect the cable on the ground from contact by persons; How to limit the likelihood of obstructing pedestrian or vehicular traffic with the cable; and How to identify the location rather than marking the cables.



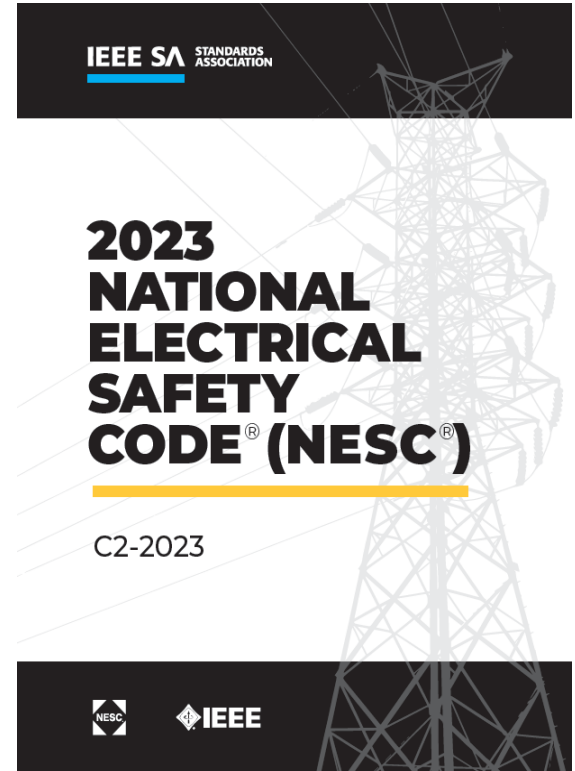
# MAJOR REVISIONS TO THE 2023 EDITION

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## Part 3. Safety Rules for Underground Lines

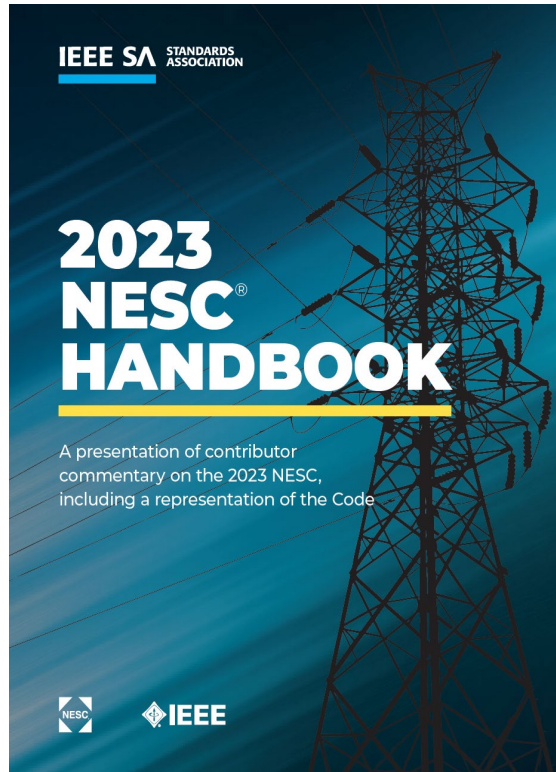
Rule 323.D.4 – Added. This new Rule 323.D.4 helps address the tripping hazards and aligns to the requirements of the Americans with Disabilities Act.

Rule 341.B.3.a.3 – Revised. The identification of cables installed in manholes and vaults are to be readable, whether by portable or fixed lighting.





# MAJOR REVISIONS TO THE 2023 EDITION



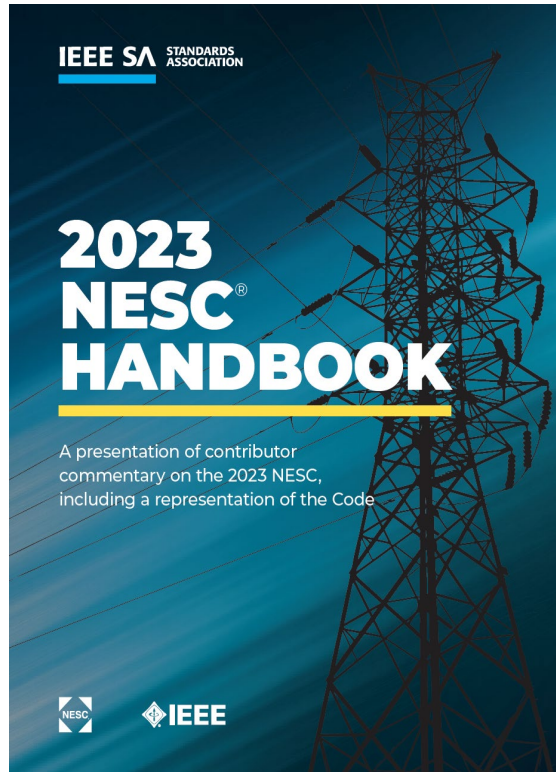
## Part 4. Work Rules

Tables 410-1 and 410-2 – Revised. Revised footnotes to clarify the calcs are based on a 15-in. separation from the arc source.

Rule 420.G – Revised. Expanded Rule 420G to encompass safe work practices for liquid cell and other battery types.

Rule 421 – Revised. Revised to reinforce that solo workers must recognize work procedures and hazards.

# MAJOR REVISIONS TO THE 2023 EDITION



## Part 4. Work Rules

Table 410-4– Addition. Added new Table 410-4 to ascribe minimum values for clothing and clothing systems relative to voltage, fault current and maximum clearing time for (medium voltage) 1kV – 36kV live front, enclosed equipment (arc in a box).

Table values are based on a 48-in. working distance and lab tests were performed.

# NESC AUDIENCE

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Nearly all U.S. states leverage the Code in whole or part, and about 100 countries worldwide use the Code in some manner. California is the only U.S. state that has its own state code; however, California reviews its requirements whenever the NESC is revised.

The NESC today is one of the most widely- adopted safety codes. The NESC is also used throughout the Caribbean islands, in US Territories, and on US military bases throughout the world.

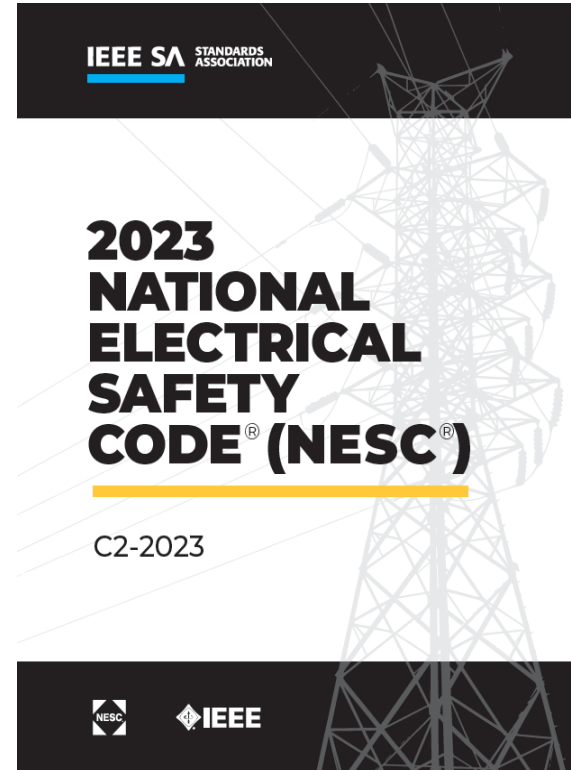


# NESC AUDIENCE

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Top entities that generally need access to the NESC:

- ❖ Utility Companies Transit Authorities/Railroads
- ❖ Electrical Supplying Companies
- ❖ Telecommunication Utilities
- ❖ Government/State Agencies
- ❖ Academic Institutions

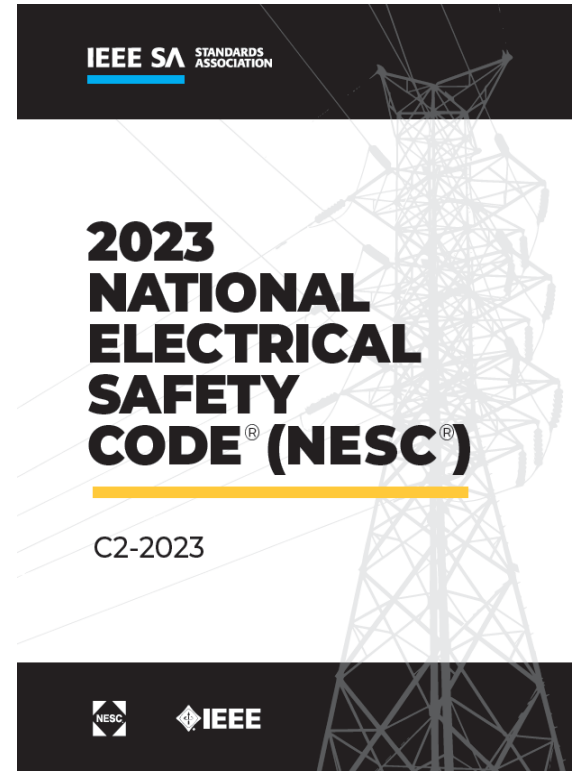


# NESC AUDIENCE

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Common job titles with interest in NESC include:

- ❖ Principal, Transmission & Distribution Engineering
- ❖ Senior Engineer
- ❖ Electrical Engineer
- ❖ Principal Engineer Standards
- ❖ Engineering Manager
- ❖ Field Engineer
- ❖ Electrician/Lineman
- ❖ Operations Management
- ❖ Safety Trainers
- ❖ Engineering and Line Design

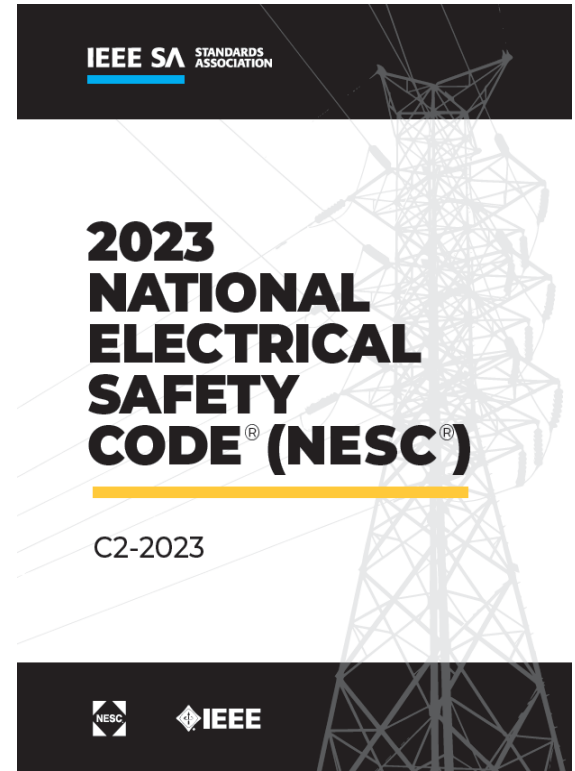


# NESC AUDIENCE

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International Interest:

- ❖ The NESC can be used for educational purposes worldwide. The basic electrical safety principles showcased in the NESC are valuable to most countries, regardless of their particular electrical grid regulations.

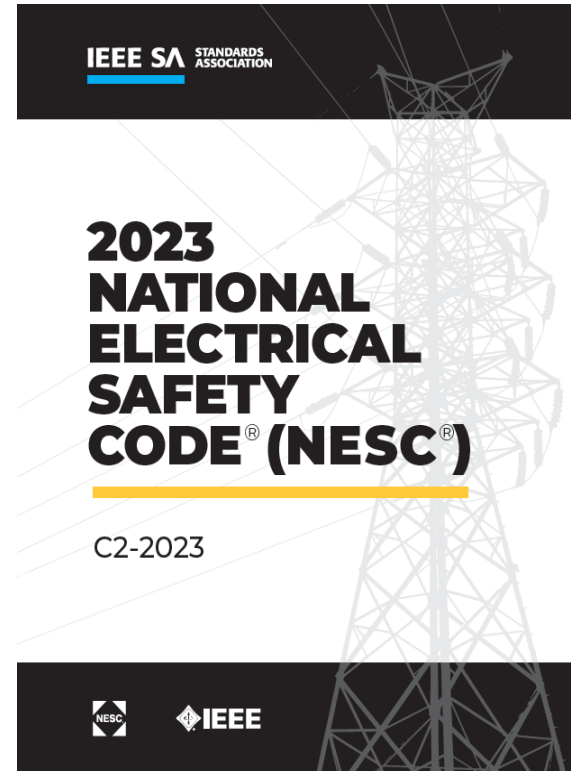


# NESC AUDIENCE

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International Interest:

- ❖ The NESC, even though it is not enforceable or adopted in many countries and territories outside the US, still holds great value to Electrical Engineering educational programs academically and for companies that develop products for and do business with the United States.



# WEB SUPPORT/CONTENT/GUIDANCE/RESOURCES

## IEEE Xplore digital Library

<https://ieeexplore.ieee.org/browse/standards/collection/ieee>

## IEEE-SA Standards Development Cycle

<https://standards.ieee.org/develop/index.html>

Overview of process, procedures

## Approved Standards

<https://standards.ieee.org/about/sba/index.html>

Listing of IEEE-SA Standard Board approvals

## Global Engagement

<https://standards.ieee.org/develop/intl/index.html>

IEEE-SA supports collaboration, development and adoption of standards across the globe in partnership with industry, governments and the public (e.g., ISO, IEC, ITU)

## IEEE Standards Dictionary

<https://ieeexplore.ieee.org/Xplore/login.jsp?url=%2Fbrowse%2Fstandards%2Fdictionary&reason=stdDict>



IEEE Xplore<sup>®</sup>  
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# ANY QUESTIONS...?

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**IEEE**

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