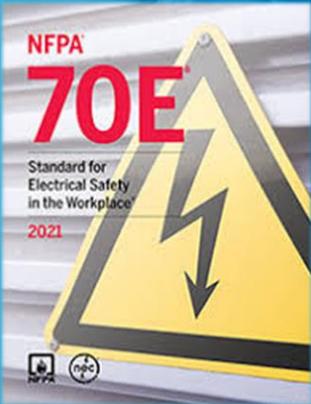


2021 NFPA 70E® Changes



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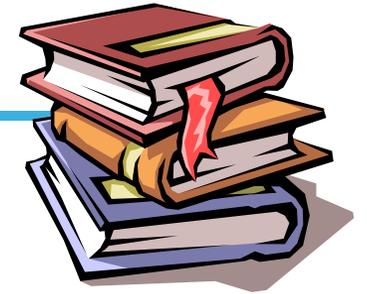
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- Your Presenter – Bob Clukey
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- All questions and discussion welcome!

2021 70E Process

First Draft

Public Input Closing Date: June 27, 2018

First Draft Report Posting Date: February 12, 2019

332 Public Inputs

86 First Revisions

Second Draft

Public Comment Closing Date: May 8, 2019

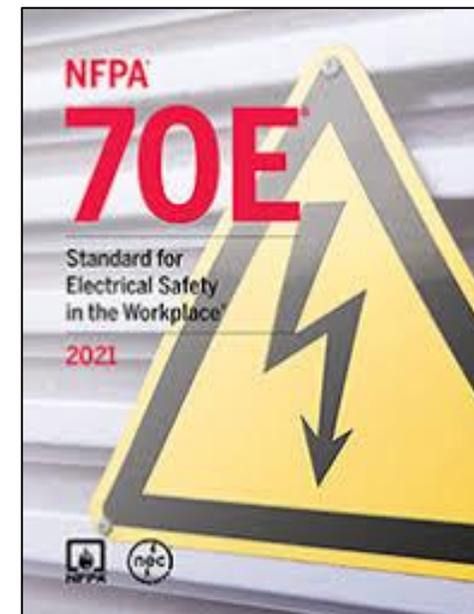
Second Draft Report Posting Date: January 12, 2020

115 Public Comments

43 Second Revisions

Second Revision

<https://submittals.nfpa.org/TerraViewWeb/ViewerPage.jsp?id=70E-2018.ditamap&pubStatus=SDR>



2021 70E Changes Definitions

2018

Barrier.

A physical obstruction that is intended to prevent contact with equipment or energized electrical conductors and circuit parts or to prevent unauthorized access to a work area.

2021

Barrier.

A physical obstruction that is intended to prevent contact with equipment or energized electrical conductors and circuit parts.

Committee Statement: This correlates the definition of the term barrier with its use in 130.7(D)(1)(f), 130.7(D)(1)(i) and other locations in the document. This revised definition does not prohibit the construction of barricades that obstruct access to a work area

2021 70E Changes Definitions

2018

Balaclava (Sock Hood). An arc-rated hood that protects the neck and head except for the facial area of the eyes and nose.

2021

Balaclava.

An arc-rated head-protective fabric that protects the neck and head except for a small portion of the facial area.

Informational Note: Some balaclava designs protect the neck and head area except for the eyes while others leave the eyes and nose area unprotected.

2021 70E Changes Definitions

2018

Electrically Safe Work Condition.

A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to verify the absence of voltage, and, if necessary, temporarily grounded for personnel protection.

2021

Informational Note: An electrically safe work condition is not a procedure, it is a state where all hazardous electrical conductors or circuit parts to which a worker might be exposed are maintained in a zero-energy de-energized state for the purpose of temporarily eliminating electrical hazards for the period of time for which the state is maintained.

Electrically Safe Work Condition.
A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to verify the absence of voltage, and, if necessary, temporarily grounded for personnel protection.

2021 70E Changes Definitions

2018

Switchgear, Arc-Resistant. Equipment designed to withstand the effects of an internal arcing fault and that directs the internally released energy away from the employee.

2021

Informational Note No. 1: An example of a standard that provides information for arc-resistant equipment is IEEE C37.20.7, Guide for Testing Switchgear Rated Up to 52 kV for

Equipment, Arc-Resistant.

Internal Arcing Faults.

Equipment designed to withstand the effects of an internal arcing fault and that directs the internally released energy away from the employee.

Informational Note No. 2: See O.2.4(9) for information on arc-resistant equipment.

2021 70E Changes Definitions

2018

Shock Hazard. A source of possible injury or damage to health associated with current through the body caused by contact or approach to energized electrical conductors or circuit parts.

2021

Shock Hazard.

A source of possible injury or damage to health associated with current through the body caused by contact or approach to **exposed** energized electrical conductors or circuit parts.

2021 70E Changes Definitions

2018

Voltage, Nominal. A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (e.g., 120/240 volts, 480Y/277 volts, 600 volts).

2021 New Informational Note for Nominal Voltage

Informational Note No. 3: Certain battery units are rated at nominal 48 volts dc but have a charging float voltage up to 58 volts. In dc applications, 60 volts is used to cover the entire range of float voltages.

2021 70E Changes Article 110

2018

110.1 Electrical Safety Program.

110.2 Training Requirements.

110.3 Host and Contract Employers' Responsibilities

110.4 Test Instruments and Equipment.

110.5 Portable Cord- and-Plug-Connected Electric Equipment.

110.6 Ground-Fault Circuit-Interrupter (GFCI) Protection.

110.7 Overcurrent Protection Modification.

2021

110.5 Electrical Safety Program.

110.6 Training Requirements.

110.7 Host and Contract Employers' Responsibilities

110.8 Test Instruments and Equipment.

110.9 Portable Cord- and-Plug-Connected Electric Equipment.

110.10 Ground-Fault Circuit-Interrupter (GFCI) Protection.

110.11 Overcurrent Protection Modification.

2021 70E Changes Article 110

110.1 Priority.

Hazard elimination shall be the first priority in the implementation of safety-related work practices. **Previously, 105.4.**

New Informational Note.

Committee Statement: This second revision improves clarity in the informational note by replacing the undefined term “zero energy” with the defined term “de-energized”. In addition, language is added to clarify that elimination is achieved by disconnecting and isolating from energy sources all electrical conductors or circuit parts to which a worker might be exposed in the area where work is to take place. Additionally, it is clarified that this de-energization is a temporary state and exists only during the period for which the electrically safe work condition for the period of time for which the state is maintained. See Informative Annex F for information regarding the hierarchy of risk control and hazard elimination. See Article 120 for requirements to establish an electrically safe work condition for the period of time for which the state is maintained. This informational note correlates with the purpose of NFPA 70E which is to provide a “practical” safe working area for employees relative to the hazards arising from the use of electricity.

2021 70E Changes Article 110

110.2 General.

Electrical conductors and circuit parts shall not be considered to be in an electrically safe work condition until all of the requirements of Article 120 have been met. Safe work practices applicable to the circuit voltage and energy level shall be used in accordance with Article 110 and Article 130 until such time that electrical conductors and circuit parts are in an electrically safe work condition. **Previously 120.2.**

The third sentence is deleted as it is identical to the first sentence.



2021 70E Changes Article 110

110.3 Electrically Safe Work Condition.

Energized electrical conductors and circuit parts operating at voltages equal to or greater than 50 volts shall be put into an electrically safe work condition before an employee performs work if any of the following conditions exist:

- 1.The employee is within the limited approach boundary.
- 2.The employee interacts with equipment where conductors or circuit parts are not exposed but an increased likelihood of injury from an exposure to an arc flash hazard exists.

Committee Statement

Whether a person is considered to be working or not is not the issue, are they exposed to a hazard. The term work is understood differently by many, some state it is when someone is being paid, others believe it is only when they are physically doing something. A person observing or watching a task is not necessarily considered to be working by everyone. This was 130.2 in the 2018 edition

2021 70E Changes Article 110

110.5



2018

(A) General.

The employer shall implement and document an overall electrical safety program that directs activity appropriate to the risk associated with electrical hazards. The electrical safety program

~~shall be implemented as part of the employer's overall occupational health and safety management system, when one exists.~~

Informational Note 2 is updated to include a reference to Annex P which provides information on aligning implementation of this standard with occupational health and safety management standards.

2021

(A) General.

The employer shall implement and document an overall electrical safety program that directs activity appropriate to the risk associated with electrical hazards

~~As directed by the Correlating Committee all references to safety management systems and safety management standards have been removed from this section of NFPA 70E and relocated in an informative annex.~~

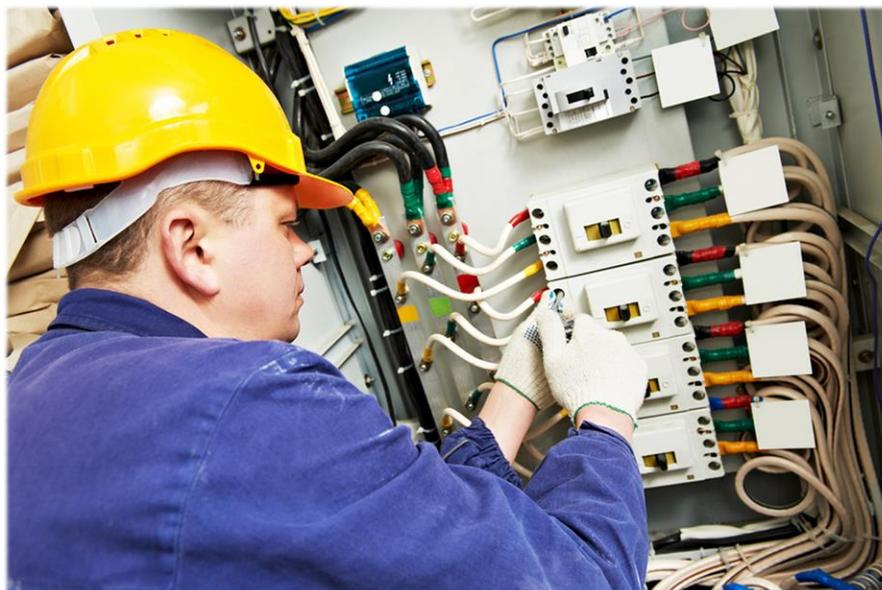
2021 70E Changes Article 110

110.5(H)2

(2) Human Error.

The risk assessment procedure shall address the potential for human error and its negative consequences on people, processes, the work environment, and **equipment relative to the electrical hazards in the workplace. New Wording!**

Informational Note: The potential for human error varies with factors such as tasks and the work environment. See Informative Annex Q.



2021 70E Changes Article 110

110.5

(K) Electrically Safe Work Condition Policy.

An electrical safety program shall include an electrically safe work condition policy that complies with 110.3.



2021 70E Changes Article 110

Section No. 110.6(A)(3)

Additional Training and Retraining.

1. Additional training and retraining in safety-related work practices and applicable changes in this standard shall be performed at intervals not to exceed 3 years. An employee shall receive additional training or retraining if any of the following conditions

Committee Statement:

exists. In addition, a lack of compliance does not always necessitate re-training. Re-training should only occur if the lack of compliance is caused by a misunderstanding of the requirements.

1. The supervision or annual inspections indicate the employee is not complying with the safety-related work practices. Willful non-compliance is addressed by other means. Further, this requirement should be re-evaluated based on the human performance modes and associated errors of Annex Q.4.

2. New technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices different from those that the employee would normally use. Retraining should be targeted to the type of error that was demonstrated (knowledge, rules, or skills).

3. The employee needs to review tasks that are performed less often than once per year.

4. The employee needs to review safety-related work practices not normally used by the employee during regular job duties.

5. The employee's job duties change.

2021 70E Changes Article 110

110.6(A)

(4) Type of Training.

The training required by 110.6(A) shall be classroom, on-the-job, or a combination of the two. The type and extent of the training provided shall be determined by the risk to the employee.

Informational Note: Classroom training can include interactive electronic or interactive web-based training components.



2021 70E Changes Article 110

110.7

(C) Documentation.

Where the host employer has knowledge of hazards covered by this standard that are related to the contract employer's work, there shall be a documented meeting between the host employer and the contract employer.

Informational Note to 110.7: On multi-employer work sites (in all industry sectors), more than one employer can be responsible for identifying hazardous conditions and creating safe work practices.

Committee Statement: Although the informational note is located after 110.7(C), it applies to all of 110.7, not just 110.7(C). This revision provides clarity.

2021 70E Changes Article 110

110.8 Test Instruments and Equipment.

(A) Testing.

Only qualified persons shall perform tasks such as testing, troubleshooting, and voltage measuring on electrical equipment where an electrical hazard exists.

Previous language stated *above 50 Volts* instead of *where an electrical hazard exists*.



2021 70E Changes Article 110

110.12 Equipment Use.

Equipment shall be used in accordance with the manufacturer's instructions.

New

In general, equipment use within the scope of NFPA 70E, should not be used in a manner that is contradictory to the manufacturer's instructions. If no instructions are provided then the AHJ can determine if the equipment is used appropriately. For the vast majority of employment places, the employer is the AHJ for following NFPA 70E. The use of equipment goes on well after installations are approved by the municipality AHJ at most employers' sites. If there are special circumstances or situations, they can be dealt with on an individual basis.



2021 70E Changes Article 120

120.2

(B) Lockout/Tagout Procedure.

A lockout/tagout procedure shall be developed on the basis of the existing electrical equipment and system and shall use suitable documentation including up-to-date drawings and diagrams. *The procedure shall meet the requirements of applicable codes, standards, and regulations for lockout and tagging of electrical sources.*

The Control of Hazardous Energy (Lockout/Tagout), Title 29 Code of Federal Regulations (CFR) Part 1910.147

ANSI/ASSE Z244. 1 (2016) The Control of Hazardous Energy – Lockout, Tagout and Alternative Methods



2021 70E Changes Article 120

120.3(C)

A lockout device shall be permitted to be only a lock, if the lock is readily identifiable as a lockout device, in addition to having a means of identifying the person who installed the lock, provided that all of the following conditions exist:

1. *Only one circuit or piece of equipment is de-energized.*
2. *The lockout period does not extend beyond the work shift.*
3. *Employees exposed to the hazards associated with re-energizing the circuit or equipment are familiar with this procedure.*

New

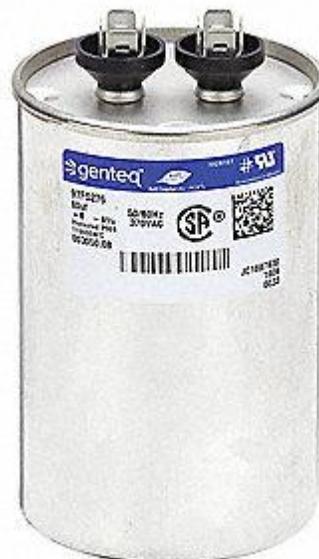


2021 70E Changes Article 120

120.4(B)

New Informational Note:

Informational Note: For more information on methods and procedures to place capacitors in an electrically safe work condition, see 360.3, 360.5, and Informative Annex R, Working with Capacitors.



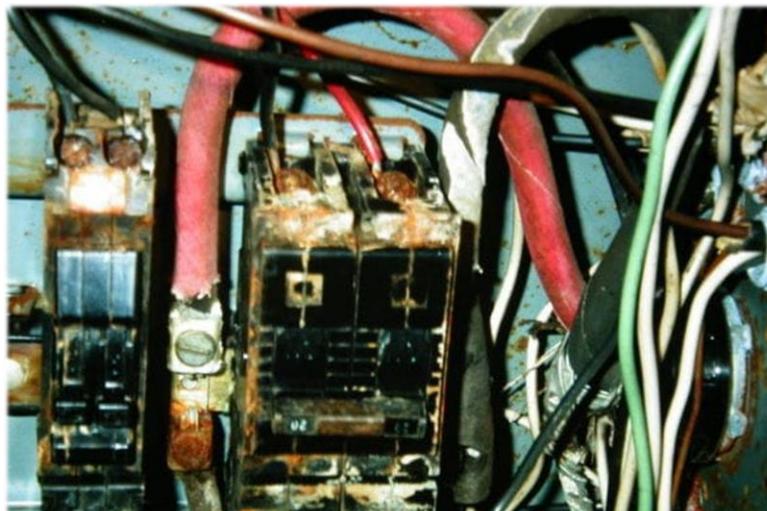
2021 70E Changes Article 130

130.4 Shock Risk Assessment

(B) Estimate of Likelihood and Severity.

The estimate of likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health shall take into consideration all of the following:

1. The design of the electrical equipment
2. The electrical equipment operating condition and the condition of maintenance



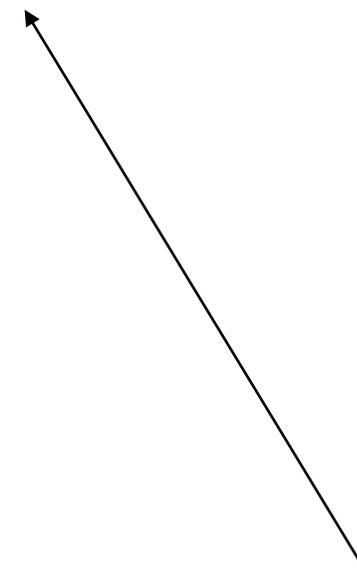
2021 70E Changes Article 130

Table 130.5(C)

| | | |
|---|-----|-----|
| For ac systems, work on energized electrical conductors and circuit parts, including electrical testing. | Any | Yes |
| Operation of a CB or switch the first time after installation or completion of maintenance in the equipment. | | |
| For dc systems, working on energized electrical conductors and circuit parts of series-connected battery cells, including electrical testing. | | |



New



2021 70E Changes Article 130

Table 130.5(G) Selection of Arc-Rated Clothing and Other PPE When the Incident Energy Analysis Method Is Used

Incident energy exposures equal to 1.2 cal/cm² up to and including 12 cal/cm²

Arc-rated clothing with an arc rating equal to or greater than the estimated incident energy^a

Arc-rated long-sleeve shirt and pants or arc-rated coverall or arc flash suit (SR)

Arc-rated face shield and arc-rated balaclava or arc flash suit hood (SR)^b

Arc-rated outerwear (e.g., jacket, parka, rainwear, hard hat liner, high-visibility ~~safety~~ apparel) (AN)^e

Heavy-duty leather gloves, arc-rated gloves, or rubber insulating gloves with leather protectors (SR)^c

Hard hat

Safety glasses or safety goggles (SR)

Hearing protection

Leather footwear^d

That wear at the point of the arc flash shall be determined to protect from the heat and blast of the arc flash, and that, in the case of a system, shall not be required to be equal to or greater than the estimated incident energy exposure.

2021 70E Changes Article 130

130.7(C)1

(1) General.

When an employee is working within the restricted approach boundary, the worker shall wear PPE in accordance with 130.4. When an employee is working within the arc flash boundary, he or she shall wear protective clothing and other PPE in accordance with 130.5. All parts of the body inside the arc flash boundary shall be protected.

Informational Note: Where the estimated incident energy exposure is greater than the arc rating of commercially available arc-rated PPE, then for the purpose of testing for the absence of voltage, the following examples of risk reduction methods could be used to reduce the likelihood of occurrence of an arcing event or the severity of exposure:

- 1. Use noncontact proximity test instrument(s) or measurement of voltage on the secondary side of a low-voltage transformer (VT) mounted in the equipment before using a contact test instrument to test for the absence of voltage below 1000 volts.*
- 2. If equipment design allows, observe visible gaps between the equipment conductors and circuit parts and the electrical source(s) of supply.*
- 3. Increase the working distance.*
- 4. Consider system design options to reduce the incident energy level.*

2021 70E Changes Article 130

Table 130.7(C)(7)(a) Maximum Use Voltage for Rubber Insulating Gloves

| Class Designation of Glove or Sleeve | Maximum ac Use Voltage rms, volts | Maximum dc Use Voltage avg, volts | Distances Between Gauntlet and Cuff, minimum |
|--------------------------------------|-----------------------------------|-----------------------------------|--|
| 00 | 500 | 750 | 13 mm (0.5 in.) |
| 0 | 1,000 | 1,500 | 13 mm (0.5 in.) |
| 1 | 7,500 | 11,250 | 25 mm (1 in.) |
| 2 | 17,000 | 25,500 | 51 mm (2 in.) |
| 3 | 26,500 | 39,750 | 76 mm (3 in.) |
| 4 | 36,000 | 54,000 | 102 mm (4 in.) |

2021 70E Changes Article 130

Table 130.7(C)(14) Informational Note: Standards for PPE

| Subject | Document Title | Document Number |
|----------------------|---|----------------------|
| Clothing — Arc Rated | Standard Performance Specification for Flame Resistant and Electric Arc Rated Protective Clothing Worn by Workers Exposed to Flames and Electric Arc | ASTM F1506 |
| | Standard Guide for Industrial Laundering of Flame, Thermal, and Arc Resistant Clothing | ASTM F1449 |
| | Standard Guide for Home Laundering Care and Maintenance of Flame, Thermal and Arc Resistant Clothing | ASTM F2757 |
| | <u>Live working — Protective clothing against the thermal hazards of an electric arc — Part 1-1: Test methods — Method 1: Determination of the arc rating (ELIM, ATPV, and/or EBT) of clothing materials and of protective clothing using an open arc</u> | <u>IEC 61482-1-1</u> |
| | <u>Live working — Protective clothing against the thermal hazards of an electric arc — Part 2: Requirements</u> | <u>IEC 61482-2</u> |

2021 70E Changes Article 360

New

Article 360 Safety-Related Requirements for Capacitors

360.1 Scope.

360.2 Definitions.

360.3 Stored Energy Hazard Thresholds.

360.4 Specific Measures for Personnel Safety.

360.5 Establishing an Electrically Safe Work Condition for the Capacitor(s)

360.6 Grounding Sticks.

2021 70E Changes Annexes

Informative Annex D Incident Energy and Arc Flash Boundary Calculation Methods

Informative Annex F Risk Assessment and Risk Control

Informative Annex R Working with Capacitors

Questions?

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