NFPA 70E- 2018 Edition Update

Paul Colangelo- STSC, CHST, CET, CRIS
National Director of Compliance Programs
ClickSafety
Agenda

- Overview of NFPA 70E
- 2018 Edition Changes
- Electrical Safety Program Criteria
- Qualified Persons
- Certified Electrical Safety Workers
- Summary/Q&A
Overview- Why should we care?

On average:

- 30,000 non-fatal electrical shock accidents occur each year
- 3,000 reported flash burn incidents
- Do you employ or supervise electricians, electrical or electronic maintenance personnel or employees who may be exposed to electrical hazards in their jobs?
- Electrical related incidents hold # 5 (LOTO) and # 10 (Wiring Methods) spots in 2017 OSHA Top 10 Most Cited Violations
Overview- OSHA & Electrical Safety

- General Industry- Subpart S- 1910.331-335
- Construction- Subpart K- 1926. 400-449
- Regulations are bare minimum law
- Standards are the “how to”
- OSHA may use any industry consensus standards for guidance
- “Incorporation by reference”- Subpart A-1910.6
- General Duty Clause
Overview - NFPA History

- **NFPA- National Fire Protection Association- 1896**
  - Non profit organization dedicated to researching the cause and effects of fire and developing consensus standards, codes and training programs that are designed to protect the public and educate them on fire safety

- **NEC- National Electrical Code (NFPA 70)- 1897**

- **NFPA 70E- Standard for Electrical Safety in the Workplace**
  - First edition published in 1979 as result of formation of NFPA Committee on Electrical Safety Requirements for Employee Workplaces to assist OSHA in 1976
Overview- NEC vs. NFPA 70E

Do you know the difference?

- **NEC (NFPA 70)** - Intended for use primarily by those who design, install, and inspect electrical installations.

- Most of the NEC requirements are not focused on electrical safety–related work practices, electrical system maintenance, or directly related to **human safety**, but rather the protection of **equipment** and **property**.
Overview- NEC vs. NFPA 70E

- **NFPA 70E** addresses safety of workers whose job responsibilities involve interaction with energized electrical equipment and systems with potential exposure to electrical hazards.

- Concepts in this standard are often adapted to other workers whose exposure to electrical hazards is unintentional or not recognized as part of their job responsibilities.

- Covers installation, removal, inspection, operation, maintenance, and demolition of electric conductors, electric equipment, signaling and communications conductors and equipment and raceways.

- Does not cover watercraft, automotive, railway, communication equipment and utility applications.
Overview- NFPA 70E

- Not just “the arc flash standard”!
- 106 pages
- Introduction- Please read!
- Chapter 1- Safety Related Work Practices
- Chapter 2- Safety Related Maintenance Requirements
- Chapter 3- Safety Requirements for Special Equipment
- Informational Annexes A-Q
Overview- NFPA 70E

- Chapter 1- Safety Related Work Practices
  - Definitions
  - Application of Safety Work Practices & Procedures
  - General Requirements of Safety Related Work Practices & Procedures
  - Establishing an Electrically Safe Work Condition
  - Work Involving Electrical Hazards

Key elements include electrical safety programs, Qualified Person criteria, training, shock protection boundaries, arc flash/blast energies, equipment labels, LOTO and PPE
Overview- NFPA 70E

- **Chapter 2- Safety Related Maintenance Requirements**
  - **NFPA 70B- Recommended Practice for Electrical Equipment Maintenance**
  - Maintenance personnel must be Qualified Persons
  - Must maintain equipment in accordance with manufacturer specifications or consensus standards
  - Safe work practices:
    - LOTO
    - Posting of warning signs
    - Grounding & bonding
Overview - NFPA 70E

❖ **Chapter 3**- Safety Requirements for Special Equipment

❖ Batteries & Battery Rooms

❖ Lasers

❖ Power Electronic Equipment

❖ R & D Laboratories
Overview - NFPA 70E

- Informational Annexes A-Q
- Annex C - Limits of Approach
- Annex E - Electrical Safety Program
- Annex G - Sample LOTO Program
- Annex H - Guidance on Selection of PPC & PPE
- Annex Q - Human Performance and Workplace Electrical Safety
2018 Edition Changes

- 2018 edition revisions not as extensive as 2015
- Text revisions are shaded.
- Δ symbol before a section number indicates that words within that section were deleted
- Δ symbol to the left of a table or figure number indicates a revision to an existing table or figure.
- When a chapter was heavily revised, the entire chapter is marked throughout with the Δ symbol.
- Where one or more sections were deleted, a • is placed between the remaining sections.
- Chapters, annexes, sections, figures, and tables that are new are indicated with an N.
2018 Edition Changes continued..

- Readdresses risk assessment and introduces **human factors**, such as human error, as part of that assessment. Annex Q, *Human Performance and Workplace Electrical Safety*, has been included to provide guidance in this area.

- Emphasizes the need to use the hierarchy of risk controls by moving it from an informational note into the text of the standard. **NFPA 70E now explicitly states that the first priority must be the elimination of the hazard.**

- The previous arc flash hazard identification table [Table 130.7(C)(15)(A)(a)] was modified to determine the **likelihood that an arc flash could occur** and renumbered as Table 130.5(C). This modified table can be used with either method of arc flash risk assessment.

- In previous editions employers were, and still are, required to verify that appropriate PPE is given to employees. **Section 130.7(C)(14)(b) was added to provide guidance on conformity assessment of PPE.**
Added definitions - Fault current and available fault current were added, and other terms used throughout the standard for this current were changed for consistency.

Article 120 - Was rearranged to present the requirements for establishing an electrically safe work condition in a logical order of application of the program.

Article 320 - Introduces voltage thresholds of 50 Vac and 100 Vdc specifically for batteries and battery rooms to address the unique situations in these locations.

Article 330 - Addressing lasers was extensively revised to address safety-related maintenance issues rather than issues associated with laser use.

Article 350 - Introduces an Electrical Safety Authority as a possible authority having jurisdiction for laboratories.
Electrical Safety Program Criteria

- Does your company have an established effective Electrical Safety Program? Does it include information on:
  - Safe work practices and procedures such as LOTO
  - Host and contract employer responsibilities
  - Energized electrical work permits
  - PPE and test equipment selection, use, maintenance
  - Training for both Qualified and Un-Qualified persons

- Refer to Chapter 1 of NFPA 70E 110.1 and Annex E to develop and measure your program against
Electrical Safety Program Criteria

Protection from electric shock:

- Core element is electrical hazard elimination

- Shock Risk Assessments include:
  - Identifying shock hazards
  - Estimating the likelihood of occurrence of injury, damage to health and the potential severity of injury or damage to health
  - Determining if additional protective measures are required, including the use of PPE
Protection from arc flash and blast:

- Sudden release of electrical energy through the air
- Gives off intense heat and light that cause severe burns and blindness
- Can reach temperatures as high as 35,000 degrees
- Produces pressure waves by rapidly heating the air, creating a blast effect thousands of pounds per square inch
Protection from arc flash & blast:

- Arc flash calculations by QP for AC and DC systems
- Probability and severity now required
- Limited and Restricted Safe Approach Boundaries for Qualified and Unqualified Workers- Refer to Annex C
- Warnings and Barricades
Equipment Labels:

- Per Section 130.5(H)- Owners of non-dwelling electrical equipment which is likely to require examination, adjustment, servicing, or maintenance while energized shall mark such equipment with a label containing all the following information:
  - Nominal system voltage
  - Arc flash boundary
  - At least one of the following:
    - Incident energy working distance or arc flash PPE category
    - Minimum arc rating of clothing
    - Site specific level of PPE

- Label information must be verified/updated at least every 5 years
Electrical Safety Program Criteria

PPE and Equipment

- Identify PPE Categories 1-4
- Must meet one of three levels of conformity per ANSI/ISEA 125, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment to measure claims of compliance
- Knowledge of calcium ratings
- Use of insulated tools, mats, gloves, aprons
- Inspection and calibration of test equipment
Electrical Safety Program Criteria

Training – Lock Out Tag Out - LOTO

- Employees involved in or affected by LOTO procedures shall be trained in LOTO procedures and their responsibility in the execution of the procedures.

- Retraining required at intervals not to exceed 3 years or when employee non-compliance is observed.

- Training must be documented.

- Employees must demonstrate proficiency in the work practices involved.
Electrical Safety Program Criteria

Training – Emergency Response

❖ **Contact Release**- Employees exposed to shock hazards and those responsible for the safe release of victims from contact with energized electrical conductors or circuit parts shall be trained in methods of safe release.

❖ Refresher training shall occur annually.

❖ **First Aid, Emergency Response & Resuscitation**

❖ Employees responsible for responding to medical emergencies shall be trained in first aid, CPR and emergency procedures, and;

❖ In the use of an automated external defibrillator (AED) if an employer’s emergency response plan includes the use of this device.
Training – Unqualified Persons

- Unqualified persons shall be trained in, and be familiar with, any electrical safety-related practices necessary for their safety.

- Type and extent of the training provided shall be determined by the risk to the employee.

- Training must be documented.

- Employees must demonstrate proficiency in the work practices involved.

- Retraining shall be performed at intervals not to exceed 3 years, unless employee non-compliance is observed or changes to their work environment, equipment or job duties occur.
Electrical Safety Program Criteria

Training – Qualified Persons

- Safe work procedures and precautionary techniques
- Selecting and using proper PPE, including arc flash insulating and shielding materials and insulated tools and test equipment
- Identifying exposed energized parts from other parts
- Determining nominal voltage of live parts
- Understanding safe approach distances
- Retraining shall be performed at intervals not to exceed 3 years, unless employee non-compliance is observed or changes to their work environment, equipment or job duties occur
Qualified Persons

- NFPA 70E specifically defines a Qualified Person as:
  - One who has demonstrated skills and knowledge related to the construction and operation of electrical equipment and installations and has received safety training to identify the hazards and reduce the associated risk.

- Licensed electricians DO NOT automatically meet that definition!

- Task and equipment specific designation

- Includes maintenance personnel

- Employer must determine through routine supervision or at least annual inspection QP compliance
Certified Electrical Safety Workers

- CESW is NFPA issued certification for electricians
- Recognizes and provides evidence of competence as related to the NFPA 70E Standard for Electrical Safety in the Workplace
- 3-year certification
- $500 investment
- 3-hour, open book, 100 question exam

http://www.nfpa.org/Training-and-Events/By-type/Certifications/Certified-Electrical-Safety-Worker
Other Helpful References

- ASSE- http://learn.asse.org
- National Electrical Contractors Association (NECA)- http://www.necanet.org/
- Institute of Electrical and Electronics Engineers (IEEE)- https://www.ieee.org/
Other Helpful References

- Center for Construction Research & Training (CPWR)
  
  http://www.cpwr.org/

- Construction Solutions
  
  http://www.cpwrconstructionsolutions.org/

WEBINAR

Wednesday, November 15 at 2:00pm ET (30 min.)

Quarterly Data Report:
Electrocutions and Prevention in the Construction Industry

Presented by:
- Dr. Wen Wang, Senior Research Associate, CPWR Data Center
- Rebecca Katz, Research Assistant, CPWR Data Center
- Chris Le, Program Manager, CPWR Construction Solutions

Electrocution is a leading cause of fatalities in construction, and has been identified as one of the Focus Four hazards by OSHA. CPWR's most recent Quarterly Data Report analyzed the trends and patterns of deaths due to electrocution, including primary sources of electrocution, vulnerable worker groups, and high-risk occupations. During this 30-minute webinar, hear from the authors of the report about their findings and updated information for electrocution prevention.

CLICK TO REGISTER
In Closing

- Know your NFPA70E standard
- Develop and maintain an Electrical Safety Program in accordance with NFPA 70E
- Conduct electrical hazard risk assessments in the workplace
- Evaluate electrical work procedures to ensure safe work practices and minimum PPE requirements
- Ensure proper PPE is available and utilized
- Train all unqualified and unqualified employees in hazard recognition and safe electrical practices

**ASSE CPS Bonus**

- ClickSafety’s new 45m Intro to NPFA 70E-2018 online course free! Coming soon!
NFPA 70E- 2018 Edition Update

Thank You! Questions?

Paul Colangelo- STSC, CHST, CET, CRIS
National Director of Compliance Programs

Connect with me on LinkedIn
5 Wall St., Burlington, MA 01803
DIRECT 978.639.3557  MOBILE 860.377.7958  TOLL FREE 1.800.971.1080 ext. 3557