

70E Compliance Simplified

Monday, September 16, 2019
8:00 AM - 9:50 AM

CONVENTION EDUCATION



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CONVENTION EDUCATION



Objectives

- Review employer responsibilities in NFPA 70E
- Electrical Safety Program (ESP) Requirements
- Qualified Persons
- Training Requirements
- Documentation Requirements
- Auditing Requirements, in the ESP

Responsibility

- **105.3 Responsibility.**
- **(A) Employer Responsibility.** The employer shall have the following responsibilities:
 - (1) Establish, document, and implement the safety-related work practices and procedures required by this standard.
 - (2) Provide employees with training in the employer's safety related work practices and procedures.

Responsibility

- **105.3 Responsibility.**
- **(B) Employee Responsibility.** The employee shall comply with the safety-related work practices and procedures provided by the employer.

Priority

- **105.4 Priority.** Hazard elimination shall be the first priority in the implementation of safety-related work practices.
- Is safety a priority or a core value to you?

Safety, is it a priority or core value?

- **Priority**

- the fact or condition of being regarded or treated as more important
- a thing that is regarded as more important than another

- **Value**

- a person's principles or standards of behavior; one's judgment of what is important in life

Safety, is it a priority or core value?

- A priority is something that changes due to outside influences and demands.
- Can job pressures push safety to the back burner?
- A value is something that outside influences cannot change
- Safety can never be compromised for a perceived shift in priorities!
- Employers and Employees must understand!

Electrical Safety Program

- **110.1(A) General.**
- The employer shall implement and document an overall electrical safety program that directs activity *appropriate to the risk associated with electrical hazards.....*
- To implement is to put into effect!

Electrical Safety Program

- IN No. 1: Safety-related work practices such as verification of proper maintenance and installation, alerting techniques, auditing requirements, and training requirements provided in this standard are administrative controls and part of an overall electrical safety program.

Electrical Safety Program

- How do we verify proper maintenance and installation today?
- What alerting techniques techniques are we using? Are they documented?
- What are your auditing requirements?
- What are your training requirements?

Electrical Safety Program

- **110.1(B) Inspection.**
- The ESP shall include elements to verify that newly installed or modified electrical equipment or systems have been inspected to comply with applicable installation codes and standards prior to being placed into service.
- Primarily for venues without standardized inspection requirements

Electrical Safety Program

- **110.1(C) Condition of Maintenance.**
- The ESP shall include elements that consider condition of maintenance of electrical equipment and systems.
- What equipment requires maintenance?
- How do we determine that condition?
- A function of training?

Electrical Safety Program

- **110.1(D) Awareness and Self-Discipline.**
- The ESP ...shall provide an awareness of the potential electrical hazards to ...shall be developed to provide the required self-discipline for all employees who must perform work that may involve electrical hazards.
- The program shall instill safety principles and controls.
- Human Performance!

Electrical Safety Program

- **110.1 (E) Electrical Safety Program Principles.** The electrical safety program shall identify the principles upon which it is based.
- **Annex E.1 Provides Typical Electrical Safety Program Principles.**
 - (1) Inspecting and evaluating the electrical equipment
 - (2) Maintaining the electrical equipment's insulation and enclosure integrity

Electrical Safety Program

- **Annex E.1 Provides Typical Electrical Safety Program Principles.**
 - (3) Planning every job and document first-time procedures
 - (4) De-energizing, if possible (see 120.5)
 - (5) Anticipating unexpected events
 - (6) Identifying the electrical hazards and reduce the associated risk

Electrical Safety Program

- **Annex E.1 Provides Typical Electrical Safety Program Principles.**
- (7) Protecting employees from shock, burn, blast, and other hazards due to the working environment
- (8) Using the right tools for the job
- (9) Assessing people's abilities
- (10) Auditing the principles

Electrical Safety Program

- **110.1(F) Electrical Safety Program Controls.** An electrical safety program shall identify the controls by which it is measured and monitored.
- **Annex E.2 Provides Typical Electrical Safety Program Controls.**

Electrical Safety Program

- **Annex E.2 Provides Typical Electrical Safety Program Controls.**
- (1) The employer develops programs and procedures, including training, and the employees apply them.
- (2) Employees are to be trained to be qualified for working in an environment influenced by the presence of electrical energy.

Electrical Safety Program

- **Annex E.2 Provides Typical Electrical Safety Program Controls.**
- (3) Procedures are to be used to identify the electrical hazards and to develop job safety plans to eliminate those hazards or to control the associated risk for those hazards that cannot be eliminated.
- (4) Every electrical conductor or circuit part is considered energized until proved otherwise.

Electrical Safety Program

- **Annex E.2 Provides Typical Electrical Safety Program Controls.**
- (5) De-energizing an electrical conductor or circuit part and making it safe to work on is, in itself, a potentially hazardous task.
- (6) Tasks to be performed within the limited approach boundary or arc flash boundary of exposed energized electrical conductors and circuit parts are to be identified and categorized.

Electrical Safety Program

- **Annex E.2 Provides Typical Electrical Safety Program Controls.**
- (7) Precautions appropriate to the working environment are to be determined and taken.
- (8) A logical approach is to be used to determine the associated risk of each task.

Electrical Safety Program

- **110.1(G) Electrical Safety Program Procedures.** An electrical safety program shall identify the procedures to be utilized before work is started by employees exposed to an electrical hazard.
- **Annex E.3 Provides Typical Electrical Safety Program Procedures.**

Electrical Safety Program

- **Annex E.3 Provides Typical Electrical Safety Program Procedures. Determine and Assess:**
 - (1) Purpose of task
 - (2) Qualifications and number of employees to be involved
 - (3) Identification of hazards and assessment of risks of the task
 - (4) Limits of approach

Electrical Safety Program

- **Annex E.3 Provides Typical Electrical Safety Program Procedures. Determine and Assess:**
 - (5) Safe work practices to be used
 - (6) Personal protective equipment (PPE) involved
 - (7) Insulating materials and tools involved
 - (8) Special precautionary techniques

Electrical Safety Program

- **Annex E.3 Provides Typical Electrical Safety Program Procedures. Determine and Assess:**
 - (9) Electrical single-line diagrams
 - (10) Equipment details
 - (11) Sketches or photographs of unique features
 - (12) Reference data

Electrical Safety Program

- **110.1(H) Risk Assessment Procedure.** The electrical safety program shall include a risk assessment procedure and shall comply with 110.1(H)(1) through 110.1(H)(3).
- **(1) Elements of a Risk Assessment Procedure.** The risk assessment procedure shall address employee exposure to electrical hazards and shall identify the process to be used by the employee before work is started to carry out the following:
 - (1) Identify hazards
 - (2) Assess risks
 - (3) Implement risk control according to the hierarchy of risk control methods

Electrical Safety Program

- **110.1(H)(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.
- See Annex Q
- The potential for human error varies with factors such as the person, the tasks and the work environment.

Electrical Safety Program

- **110.1(H)(3) Hierarchy of Risk Control Methods.** The risk assessment procedure shall require that preventive and protective risk control methods be implemented in accordance with the following hierarchy:
 - (1) Elimination, (2) Substitution, (3) Engineering controls, (4) Awareness, (5) Administrative controls and (6) PPE

Table E.3 The Hierarchy of Risk Control Methods

Risk Control Method	Examples
(1) Elimination	Conductors and circuit parts in an electrically safe working condition
(2) Substitution	Reduce energy by replacing 120 V control circuitry with 24 Vac or Vdc control circuitry
(3) Engineering controls	Guard energized electrical conductors and circuit parts to reduce the likelihood of electrical contact or arcing faults
(4) Awareness	Signs alerting of the potential presence of hazards
(5) Administrative controls	Procedures and job planning tools
(6) PPE	Shock and arc flash PPE

Electrical Safety Program

- **110.1(I) Job Safety Planning and Job Briefing.** Before starting each job that involves exposure to electrical hazards, the employee in charge shall complete a job safety plan and conduct a job briefing with the employees involved.

Electrical Safety Program

- **110.1(I)(1) Job Safety Planning.** The job safety plan shall be in accordance with the following:
 - (1) Be completed by a qualified person
 - (2) Be documented
 - (3) Include the following information:

Electrical Safety Program

- a. *A description of the job and the individual tasks*
- b. Identification of the *electrical hazards* associated with each task
- c. *A shock risk assessment* in accordance with 130.4 for tasks involving a shock hazard
- d. *An arc flash risk assessment* in accordance with 130.5 for tasks involving an arc flash hazard
- e. Work procedures involved, special precautions, and energy source controls

Electrical Safety Program

- **110.1(I)(2) Job Briefing.** The job briefing shall cover the *job safety plan* and the information on the *energized electrical work permit*, if a permit is required.
- **(3) Change in Scope.** Additional job safety planning and job briefings shall be held *if changes occur during the course of the work that might affect the safety of employees.*

Electrical Safety Program

- **110.1(J) Incident Investigations.** The electrical safety program shall include elements to investigate electrical incidents.
- Events or occurrences that result in, or could have resulted in, a fatality, an injury, or damage to health.
- Commonly referred to as a “close call” or “near miss.”

Electrical Safety Program

- **110.1(K) Auditing.**
- **(1) Electrical Safety Program Audit.** The electrical safety program shall be audited to verify that the principles and procedures of the electrical safety program are in compliance with this standard. Audits shall be performed at intervals not to exceed 3 years.

Electrical Safety Program

- **110.1(K) Auditing.**
- **(2) Field Work Audit.** *Field work* shall be audited to verify that the requirements contained in the procedures of the electrical safety program are being followed.... appropriate revisions to the training program or revisions to the procedures shall be made. Audits shall be performed at intervals not to exceed 1 year.
- Risk assessment procedure and shock and arc flash risk assessments!

Electrical Safety Program

- **110.1(K) Auditing.**
- **(3) Lockout/Tagout Program and Procedure Audit.** The *LOTO program and procedures required by Article 120* shall be audited by a *qualified* person *at intervals not to exceed 1 year*. The audit shall cover *at least one lockout/tagout in progress*.....

Electrical Safety Program

- **110.1(K) Auditing.**
- **(3) Lockout/Tagout Program and Procedure Audit.**
..... The audit shall be designed to identify and correct deficiencies in the following:
 - (1) The lockout/tagout program and procedures
 - (2) The lockout/tagout training
 - (3) Worker execution of the lockout/tagout procedure

Electrical Safety Program

- **110.1(K) Auditing.**
- **(4) Documentation.** The audits required by 110.1(K) shall be documented.
- If it is not documented, it did not happen.....

Qualified Persons

- **Qualified Person.** 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.
- This is the general definition! 70E goes much further!

Qualified Persons

- Who makes the determination?
- When is this determination made?
- What if someone is not qualified?

Qualified Persons

- **110.2 Training Requirements.**
- **(A) Electrical Safety Training**....apply to employees exposed to an electrical hazard when the risk associated with that hazard is not reduced to a safe level by the applicable electrical installation requirements. Such employees shall be trained to understand the specific hazards associated with electrical energy.....

Qualified Persons

- **110.2 Training Requirements.**
- **(A) Electrical Safety Training**....They shall be trained in safety-related work practices and procedural requirements, as necessary, to provide protection from the electrical hazards associated with their respective job or task assignments. Employees shall be trained to identify and understand the relationship between electrical hazards and possible injury.

Qualified Persons

- **110.2(A)(1) Qualified Person.** A qualified person shall be trained and knowledgeable in the construction and operation of equipment or a specific work method and be trained to identify and avoid the electrical hazards that might be present with respect to that equipment or work method.

Qualified Persons

- **110.2(A)(1)(a)** Such persons shall also be familiar with the proper use of the special precautionary techniques, applicable electrical policies and procedures, PPE, insulating and shielding materials, and insulated tools and test equipment.

Qualified Persons

- **110.2(A)(1)(b)** A person can be considered qualified with respect to certain equipment and tasks but still be unqualified for others.
- Are you qualified?
- For what, no limitations?

Qualified Persons

- **110.2(A)(1)(c)** Such persons permitted to work within the limited approach boundary shall, at a minimum, be additionally trained in all of the following:
 - (1) Skills and techniques necessary to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment
 - (2) Skills and techniques necessary to determine the nominal voltage of exposed energized electrical conductors and circuit parts

Qualified Persons

- **110.2(A)(1)(c)**
- (3) Approach distances specified in Table 130.4(D)(a) and Table 130.4(D)(b) and the corresponding voltages to which the qualified person will be exposed

Qualified Persons

- **110.2(A)(1)(c)**
- (4) Decision-making process necessary to be able to do the following:
 - a. Perform the job safety planning, b. Identify electrical hazards, c. Assess the associated risk, d. Select the appropriate risk control methods from the, hierarchy of controls identified in 110.1(G), including personal protective equipment

Qualified Persons

- **110.2(A)(1)(d)** An employee who is undergoing on-the-job training...
- (e) Employees shall be trained to select an appropriate test instrument and shall demonstrate how to use a device to verify the absence of voltage, including interpreting indications provided by the device. The training shall include information that enables the employee to understand all limitations of each test instrument that might be used.

Qualified Persons

- **110.2(A)(1)(f)** The employer shall determine through regular supervision or through inspections conducted on at least an annual basis that each employee is complying with the safety-related work practices required by this standard.
- Documentation is required by 110.2(A)(5)
- How do we get this done?

Qualified Persons

- **110.2(A)(2) Unqualified Persons.** Unqualified persons shall be trained in, and be familiar with, any electrical safety-related practices necessary for their safety.
- **Unqualified Person.** A person who is not a qualified person.

Qualified Persons

- **110.2(A)(3) Retraining.** 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 exists:
 - (1) The supervision or annual inspections indicate the employee is not complying with the safety-related work practices.

Qualified Persons

- **110.2(A)(3) Retraining.**
- (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.
- (3) The employee needs to review tasks that are performed less often than once per year.

Qualified Persons

- **110.2(A)(3) Retraining.**
- (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.

Qualified Persons

- **110.2(A)(4) Type of Training.**
- ...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.

Qualified Persons

- **110.2(A)(4)(5) Electrical Safety Training Documentation.** The employer shall document ... in accordance with the following:
 - (1) ..when the employee demonstrates proficiency in the work practices involved
 - (2) ..retained for the duration of employment
 - (3) Contain the content of the training, each employee's name, and dates of training

Qualified Persons

- **110.2(B) Lockout/Tagout Procedure Training.**
- **(1) Initial Training.** Employees involved in or affected by the lockout/tagout procedures required by 120.2 shall be trained in the following:
 - (1) The lockout/tagout procedures
 - (2) Their responsibility in the execution of the procedures

Qualified Persons

- **110.2(B) Lockout/Tagout Procedure Training.**
- **(2) Retraining.** Retraining in the LOTO procedures shall be performed as follows:
 - (1) When the procedures are revised
 - (2) At intervals not to exceed 3 years
 - (3) When supervision or annual inspections indicate that the employee is not complying with the lockout/tagout procedures

Qualified Persons

- **110.2(B) Lockout/Tagout Procedure Training.**
- **(3) Lockout/Tagout Training Documentation.**
- (a) The *employer shall document* that each employee has received the training required by 110.2(B).
- (b) The documentation shall be made when the employee demonstrates proficiency in the work practices involved.
- (c) ..contain the content of the training... names, and dates...

Qualified Persons

- **110.2(C) Emergency Response Training.**
- **(1) 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.*

Qualified Persons

- **110.2(C) Emergency Response Training.**
- **(2) First Aid, Emergency Response, and Resuscitation.**
- (a) Employees responsible for responding to medical emergencies shall be trained in first aid and emergency procedures.
- (b) Employees responsible for responding to medical emergencies shall be trained in cardiopulmonary resuscitation (CPR).

Qualified Persons

- **110.2(C) Emergency Response Training.**
- **(2) First Aid, Emergency Response, and Resuscitation.**
- (c) Employees responsible for responding to medical emergencies shall be trained in the use of an automated external (AED) if an employer's emergency response plan includes the use of this device.
- (d) Training shall occur at a frequency that satisfies the requirements of the certifying body.

Qualified Persons

- **110.2(C) Emergency Response Training.**
- **(3) Training Verification.** Employers shall verify at least annually that employee training required by 110.2(C) is current.
- **(4) Documentation.** The employer shall document that the training required by 110.2(C) has occurred.

Employer Responsibilities

- **110.3 Host and Contract Employer's Responsibilities**
- Informational Note: Examples of a host employer can include owner or their designee, construction manager, general contractor, or employer.

Employer Responsibilities

- **110.3 Host and Contract Employer's Responsibilities**
- **(B) Contract Employer Responsibilities.**
- (1) The contract employer shall ensure that each of his or her employees is instructed in the hazards communicated to the contract employer by the host employer....

Employer Responsibilities

- **110.3 Host and Contract Employers' Responsibilities**
- **(B) Contract Employer Responsibilities.**
- (2) Hazards identified during the course of work by the contract employer that were not communicated by the host employer
- (3) The measures the contractor took to correct any violations reported by the host employer under 110.3(A)(2) and to prevent such violation from recurring in the future

Employer Responsibilities

- **110.3 Host and Contract Employers' Responsibilities**
- **(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.

Employer Responsibilities

- **110.4 Test Instruments and Equipment.**
- **(A) Testing.** Only qualified persons shall perform tasks such as testing, troubleshooting, and voltage measuring on electrical equipment operating at voltages equal to or greater than 50 volts



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SOLENOID TESTERS TRAINING

Considerations

These testers are considered to be momentary test devices only. They may not be used to continuously monitor live voltage.

They are low impedance devices which consume a small amount of power when activating the coil with voltage. This causes heat to build up within the tester. Like many solenoids, they are not intended to be energized for long periods of time and must be allowed to cool between uses. This becomes more critical when indicating the presence of higher voltages up to the rated operational voltages. **These are momentary indication devices.**

NOTE: *You MUST adhere to the active test time, voltage level, and waiting period between testing guidelines as denoted on the front of the tester to ensure that the solenoid tester adequately cools before continued testing.*

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Employer Responsibilities

- **120.1 Lockout/Tagout Program.**
- **(A) General.** Each employer shall establish, document, and implement a lockout/tagout program. The lockout/tagout program shall specify lockout/tagout procedures to safeguard workers from exposure to electrical hazards. The lockout/ tagout program and procedures shall also incorporate the following.....

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Employer Responsibilities

- **120.3(B) Lockout/Tagout Device.** Each employer shall supply, and employees shall use, lockout/tagout devices and equipment necessary to execute the requirements of 120.3.....

Employer Responsibilities

- **120.4 Lockout/Tagout Procedures.** The employer shall maintain a copy of the procedures required by this section and shall make the procedures available to all employees.

Employer Responsibilities

- **120.4(A) Planning.**
- **(1) Locating Sources.** Up-to-date single-line drawings shall be considered a primary reference source for such information. When up-to-date drawings are not available, the employer shall be responsible for ensuring that an equally effective means of locating all sources of energy is employed.

Employer Responsibilities

- **120.4(B) Elements of Control.**
- **(12) Removal of Lockout/Tagout Devices.** The procedure shall identify the details for removing locks or tags when the installing individual is unavailable. When locks or tags are removed by someone other than the installer, the employer shall attempt to locate that person prior to removing the lock or tag. When the lock or tag is removed because the installer is unavailable, the installer shall be informed prior to returning to work.

Employer Responsibilities

- **120.5 Process for Establishing and Verifying an Electrically Safe Work Condition.** List item (8)
- a. Placement.The location, sizing, and application of temporary protective grounding equipment shall be identified as part of the employer's job planning.

Employer Responsibilities

- **130.2 Electrically Safe Work Conditions.**
- **(A) Energized Work.**
- **(1) Additional Hazards or Increased Risk.** Energized work shall be permitted where the employer can demonstrate....
- **(2) Infeasibility.** Energized work shall be permitted where the employer can demonstrate

Employer Responsibilities

- **130.2(B)(3) Exemptions to Work Permit.** Electrical work shall be permitted without an energized electrical work permit if a qualified person is provided with and uses appropriate safe work practices and PPE in accordance with Chapter 1 under any of the following conditions.....

Employer Responsibilities

- **130.3 Working While Exposed to Electrical Hazards.....**
.....Only qualified persons shall be permitted to work on electrical conductors or circuit parts that have not been put into an electrically safe work condition.

Employer Responsibilities

- **130.6(F) Confined or Enclosed Work Spaces.** When an employee works in a confined or enclosed space (such as a manhole or vault) that contains exposed energized electrical conductors or circuit parts operating at voltages equal to or greater than 50 volts or where an electrical hazard exists, the employer shall provide, and the employee shall use, protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with these parts and the effects of the electrical hazards

Employer Responsibilities

- **130.6(K) Anticipating Failure.** When there is evidence that electric equipment could fail and injure employees, the electric equipment shall be de-energized, unless the employer can demonstrate that de-energizing introduces additional hazards or increased risk or is infeasible because of equipment design or operational limitation.....

Employer Responsibilities

- **130.6(N) Safety Interlocks.** Only qualified persons following the requirements for working inside the restricted approach boundary as covered by 130.4(D) shall be permitted to defeat or bypass an electrical safety interlock.....

Employer Responsibilities

- **130.7 Personal and Other Protective Equipment.**
- **(A) General.** Employees exposed to electrical hazards when the risk associated with that hazard is not adequately reduced by the applicable electrical installation requirements shall be provided with, and shall use, protective equipment that is designed and constructed for the specific part of the body to be protected and for the work to be performed

Employer Responsibilities

- **130.8 Work Within the Limited Approach Boundary or Arc Flash Boundary of Overhead Lines.**
- **(B) Determination of Insulation Rating.** A *qualified person shall determine if the overhead electrical lines are insulated for the lines' operating voltage.*

Employer Responsibilities

- **130.8 Work Within the Limited Approach Boundary or Arc Flash Boundary of Overhead Lines.**
- **(D) Employer and Employee Responsibility.** The *employer and employee shall be responsible for ensuring that guards or protective measures are satisfactory for the conditions.* Employees shall comply with established work methods and the use of protective equipment.

Employer Responsibilities

- **130.9 Underground Electrical Lines and Equipment.** Before excavation starts where there exists a reasonable possibility of contacting electrical lines or equipment, the employer shall take the necessary steps to contact the appropriate owners or authorities to identify and mark the location of the electrical lines or equipment.....

Employer Responsibilities

- **130.10 Cutting or Drilling.** Before cutting or drilling into equipment, floors, walls, or structural elements where a likelihood of contacting energized electrical lines or parts exists, the employer shall perform a risk assessment to:
 - (1) Identify and mark the location of conductors, cables, raceways, or equipment
 - (2) Create an electrically safe work condition
 - (3) Identify safe work practices and PPE to be used

Employer Responsibilities!



Complete the Online Evaluation

Up Next...

- **10:15 am-11:30 am** – *General Session with John Ondrasik* in Mandalay Bay Ballroom EFGH
- **11:30 am-4:00 pm** – *NECA Show Hours*

