

NFPA 70E, 2018

How does this impact the GC or CM?
MACSC
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Objectives

- Who needs ESWP's?
- Responsibilities
 - *Individual (exposing) employers*
 - *GC, CM, (controlling) employers*
- Electrical hazards
- What proactive steps should the GC,CM or owner etc. take?
- Practical application

Who needs ESWP's?

- Which trades may be exposed?
- NFPA 70E: *"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."*
- Carpenters, Sprinkler Fitters, Electricians, Fitters HVAC, Elevator Constructors, Laborers, Brick Layers and more.....

Responsibilities

- Individual Employers
 - *Training (24-hr 98)*
 - *Qualified persons*
 - *Policies, procedures, ESWPP*
 - *PPE*
- GC, CM, Controlling Employers
 - *Is the GC or CM an SME?*
 - *Due diligence*
 - *Discuss later*

Responsibilities

- Individual Employers
 - *What type of work are they performing*
 - *Construction OSHA 1926*
 - *General Industry OSHA 1910*
 - *Is there a difference?*

Responsibilities

- OSHA is the *SHALL*
- 70E shows us *HOW*
- Is 70E a regulation or law?
- Only the DOE has formally adopted NFPA 70E
- Who enforces 70E?
- What is the individual employer **legally** required to do?
- Comply with OSHA regulations

Responsibilities

- What electrical related written plans and training are required by 1926?
 - 1926.21, *general hazard recognition and avoidance, NO mention of electrical hazards*
 - 1926.404(b) *written AEGCP*

Responsibilities

- What practices, procedures and PPE are referenced in 1926?
 - 1926.95, *reason of hazards of processes or environment*
 - 1926.28(a) *Electrical PPE, rubber goods only, no arc flash PPE*
 - 1926.416, *prohibits contact*
 - 1926.417, **Locking and Tagging**, *only requires "render inoperative", no requirement for written procedures*

Responsibilities, 1926

- NO help from OSHA
- NO prescriptive requirements
- Performance based requirements that promote exposure
- What do we do?
- Look at 1910

Responsibilities

- What written plans and training are required by 1910?
 - 1910.332, *specific training requirements similar to NFPA 70E*
 - 1910.333(b)(2) *written LOTO procedures*
 - 1910.304(b) *written AEGCP*
- PPE in 1910.333(C)(2), (performance)
- Rubber goods 1910.137

Proactive Steps, GC & CM

- What are you doing right now?
- Mandate:
 - *an ESWPP in accordance with NFPA 70E or equivalent*
 - *Written, prescriptive LOTO*
 - *List of employees qualified in accordance with NFPA 70E or equivalent*
 - *Documentation of training for all qualified persons*

Proactive Steps, GC & CM

- Mandate:
 - *Zero tolerance policies*
 - *Notification of energized work*
 - *MEP meetings, is there a need to get back into equipment about to be energized?*
 - *Plan!*
 - *Temporary power installation*

Electrical Hazards

- Shock
 - *Current flow through the body*
- Arc Flash
 - *Temperatures can exceed 35,000 degrees F*
 - *Current and time*
- Arc Blast
 - *Tremendous pressures, shrapnel, sound levels*

Annex K, Electrical Hazards

- 1992 through 2012, 6,000 electrical fatalities of which over 40% (2,400) are overhead power line contact
- Fatal injuries declining, non-fatal injuries are not
- 98% of injuries are from shock
- 40% of those occur at 250 volts or less, indicating misperception

Annex K, Electrical Hazards

- From 2003 to 2009 there were 20,033 electrical injuries of which 1,573 were fatalities
- From 2003 to 2009 there were 1,718,219 fall injuries of which 5,279 were fatalities
- Meaning.....

Annex K, Electrical Hazards

- One worker died for every 325 fall related injuries
 - 1 to 325
- One worker died for every 12.74 electrical related injuries
 - 1 to 12.74

Foreward to NFPA 70E

- Second sentence....
- The committee was formed to assist OSHA in preparing an electrical safety standard that would serve OSHA's needs and that could be expeditiously promulgated through the provisions of Section 6(b) of the Occupational Safety and Health Act.
-an **electrical safety standard**.....

Purpose of 70E

- **90.1 Purpose.** The purpose of this standard is to provide a practical safe working area for employees relative to the hazards arising from the use of electricity.

90.2 Scope

- **90.2 Scope.**
- **90.2(A) Covered.** This standard addresses electrical safety-related work practices, safety-related maintenance requirements, and other administrative controls for employee workplaces that are necessary for the practical safeguarding of employees relative to the hazards associated with electrical energy

Article 100: Electrically Safe Work Condition

- **Electrically Safe Work Condition.** A state in which an electrical conductor or circuit part has been (1) disconnected from energized parts, (2) locked/tagged in accordance with established standards, (3) tested to verify the absence of voltage, and, if necessary, (4) temporarily grounded for personnel protection.

100 Electrically Safe Work Condition

- Is an ESWC more than just opening a disconnect?
- Is an ESWC more than LOTO?
- Is and ESWC more than just verifying absence of voltage?
- Yes, Yes and Yes
- An ESWC is a **state** in which electrical hazards have been eliminated

100 Electrically Safe Work Condition

- OSHA recognizes an ESWC as a zero energy state
- OSHA recognizes that we have eliminated the hazards
- Electrically **SAFE** Work Condition

110.1 Electrical Safety Program

- (A) General.
- (B) Inspection
- (C) Condition of Maintenance
- (D) Awareness & Self Discipline
- (E) ESP Principles
- (F) ESP Controls

110.1 Electrical Safety Program

- (G) ESP Procedures
- (H) Risk Assessment Procedure
- (I) Job Safety Planning & Job Briefing
- (J) Incident Investigations
- (K) Auditing

110.1 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.** The electrical safety program shall be implemented as part of the employer's overall occupational health and safety management system, when one exists.

110.1 (H) Risk Assessment Procedure

- **110.1(H)(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

110.1(H) (3) Hierarchy of Risk Control Methods

- **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:

110.1(H) (3) Hierarchy of Risk Control Methods

- **110.1(H)(3) Hierarchy of Risk Control Methods...**
 - (1) Elimination
 - (2) Substitution
 - (3) Engineering controls
 - (4) Awareness
 - (5) Administrative controls
 - (6) PPE

110.1(H) (3) Hierarchy of Risk Control Methods IN No. 1

- Informational Note No. 1: Elimination, substitution, and engineering controls are the most effective methods to reduce risk as they are usually applied at the source of possible injury or damage to health and they are less likely to be affected by human error. Awareness, administrative controls, and PPE are the least effective methods to reduce risk as they are not applied at the source and they are more likely to be affected by human error.

110.1(H) (3) Hierarchy of Risk Control Methods

- (1) Elimination, **most effective**
- (2) Substitution, **most effective**
- (3) Engineering controls, **most effective**
- (4) Awareness, **least effective**
- (5) Administrative controls, **least effective**
- (6) PPE, **least effective**

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

Practical Application

- Require all exposing employers to provide ESWPP's, list of qualified persons and training documentation
- Employers verify training 110.2
- Employers identify qualified persons
- Employers implement policies, procedures
- REMBER! The goal of 70E is **hazard elimination**

Practical Application

- When does a shock hazard exist?
- When does an arc flash hazard exist?
- Triggers
- Justification of energized work
 - *Infeasibility*
 - *Additional Hazards or increased risk (Catch 22)*
- Instead of a scheduled shutdown of known duration, the owner gets an **unscheduled shutdown of unknown duration**

Practical Application

- Qualified persons perform
 - *Shock risk assessment*
 - *Arc flash risk assessment*
 - Incident Energy Analysis
 - AF PPE Tables
- Energized Electrical Work Permits
 - *Requires approval signature from owner or owners representative*
 - *Signing documents you accept a degree of responsibility*

Assume an Incident Occurred

- A serious injury or fatality occurred on one of your projects
- Will OSHA investigate?
- Will your company be named as a defendant in a 3rd party civil suit?
- Will you be involved?
- Did you perform "due diligence"?

Depositions

- Did you require an ESWPP, list of qualified persons and training documentation?
- Are your project managers, superintendents, foreman safety professionals and MEP coordinators SME's?
- Are they OSHA 10 or 30 hour trained?
- Do they understand that shock and arc flash are recognized hazards?

Depositions

- Did they have knowledge this work was being performed?
- Did you implement a zero tolerance policy on this project?
- Without proactive steps prior to awarding a contract, and throughout a project, it is easy to implicate the GC and CM

Summary

- Getting ESWP's right on your project is not rocket science
- ESWPP's, qualified persons, training documentation
- Implement zero tolerance policies
- There is much, much more to 70E for contractors and qualified persons
- Today we focused on basic responsibilities of the GC and CM

It is all about "change"

- Dr. W. Edwards Deming
- "It is not necessary to change. Survival is not mandatory."

Questions?