

Implementing NFPA 70E at your Facility

By W. Jon Wallace, CSP, MBA

Over 600 workers are electrocuted annually – it is the 4th leading cause of workplace fatalities in the United States. If you have employees working on or near exposed energized electrical parts, electrical safe work practices are essential. Historically, unsafe equipment and unsafe conditions are responsible for approximately one-third of all electrical incidents and injuries. The remaining two-thirds of electrical injuries and incidents are caused by unsafe acts – how workers interact with equipment. Therefore, this article will primarily address Safety-Related Work Practices outlined in Chapter 1 of NFPA 70E: Standard for Electrical Safety in the Workplace – 2004 Edition. However, requirements contained within Chapter 2 – 4 are also included.

A written procedure is necessary to document electrical safe work practices applicable by qualified persons at your facility. Listed below are major requirements of NFPA 70E that should be included in this procedure.

Chapter 1: Safety-Related Work Practices

Chapter 1 specifies electrical safe work practices for the following employees:

Qualified Person: One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training on the hazards involved. This is typically an electrician or maintenance employee who has responsibility of working with or around energized electrical conductors. It is important to understand that a worker who has been trained to perform an electrical task might be qualified to perform that task and still be unqualified to perform any other task. The characteristics of being qualified and unqualified are task specific.

Unqualified Person: One who is not a qualified person. This includes: machine operators, process operators, and maintenance employees who do not perform work on or around exposed energized electrical conductors.

Article 110: General Requirements for Electrical Safety-Related Work Practices

Article 110 covers electrical safety-related work practices and procedures for employees who work on or near exposed energized electrical conductors or circuit parts. Major provisions of this article are summarized below.

Subject	Article	Requirement
Training	110.6	Employees who face a risk of electrical hazard not reduced to a safe level as required during normal conditions shall be trained to understand the specific hazards associated with electrical energy. Training is required for “Qualified Persons” as well as “Unqualified Persons”.
Electrical Safety Program	110.7	An overall electrical safety program is required to address activities appropriate for work activities at or above 50 volts.
Working on or Near Electrical Conductors or Circuit Parts	110.8	Live electrical parts shall be deenergized before an employee works on or near them unless working on energized components is imperative. If work on energized equipment is essential, an electrical hazard analysis shall be performed.
Energized Electrical Work Permit	110.8(B)(2)	A permit shall be issued prior to working on energized electrical conductors. Work tasks not requiring an electrical permit include: testing, troubleshooting, and voltage measuring.
Safety Interlocks	110.8 (B)(4)	Only a qualified person shall be permitted to bypass or defeat an electrical safety interlock, and then only temporarily while working on the equipment.
Visual Inspection of Portable Cord-and-Plug Connected Equipment and Flexible Cord Sets	110.9 (B)(3)	Prior to use, portable cord-and-plug connected equipment shall be visually inspected for defects.
GFCI Protection Devices	110.9 (C)	Ground fault circuit Interrupter protection devices shall be tested per manufacturer’s instructions.

Article 120: Establishing an Electrically Safe Work Condition

Article 120 requires employers implement lockout/tagout procedures to safeguard employees from exposure to electrical hazards while they are working on or near energized electrical conductors or circuit parts.

Subject	Article	Requirement
Electrical Safe Work Condition	120.1	All possible sources of electrical energy shall be identified, deenergized, and locked out. Whenever possible, visually verify that all blades of the disconnecting devices are fully open or that drawout type circuit breakers are withdrawn to the fully disconnected position. In addition, each phase conductor shall be tested with a voltage tester to verify a deenergized condition.
Employee Involvement	120.2 (B)	Each person potentially exposed directly or indirectly to a source of electrical energy shall be involved with the lockout process and shall be trained to understand their role in the lockout/tagout procedure.
Audit Procedure	120.2 (C)(3)	An annual audit shall be performed by a qualified person. Noted deficiencies shall be corrected.

Article 130: Working on or Near Live Parts

Article 130 states that electrical conductors shall be deenergized before an employee works on or near them unless the employer can demonstrate that deenergizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations. Typical examples include, but are not limited to, interruption of life support equipment, deactivation of emergency alarm systems, and shutdown of hazardous location ventilation equipment. If work must be performed on energized conductors, a shock hazard analysis and flash hazard analysis must be performed. For more information on performing a flash hazard analysis please refer to my article: Performing the Flash Hazard Analysis.

Chapter 2: Safety-Related Maintenance Requirements

Electrical equipment is, in most cases, very reliable. Sometimes this reliability is taken for granted. A comprehensive electrical equipment maintenance program improves electrical system reliability and thereby reduces exposure of electrical hazards to workers.

Chapter 2 addresses safety-related maintenance requirements for electrical equipment and installations, or parts of either, for the safety of employees who work on, near, or with such equipment:

Article 200: Introduction

Article 205: General Maintenance Requirements

Article 210: Substations, Switchgear Assemblies, Switchboards, Panelboards, Motor Control Centers, and Disconnect Switches

Article 215: Premises Wiring

Article 220: Controller Equipment

Article 225: Fuses and Circuit Breakers

Article 230: Rotating Equipment

Article 235: Hazardous (Classified) Locations

Article 240: Batteries and Battery Rooms

Article 245: Portable Electric Tools and Equipment

Article 250: Personal Safety and Protective Equipment

Chapter 3: Safety Requirements for Special Equipment

Some companies have unique electrical applications that differ from general industry. These unique applications may expose employees to specific electrical hazards. Chapter 3 covers electrical safety installation requirements and safety-related work practices and procedures for employees who work on or near special electrical equipment in the workplace:

Article 300: Introduction

Article 310: Safety-Related Work Practices for Electrolytic Cells

Article 320: Safety Requirements Related to Batteries and Battery Rooms

Article 330: Safety-Related Work Practices for Use of Lasers

Article 340: Safety-Related Work Practices: Power Electronic Equipment

Chapter 4: Installation Safety Requirements

NFPA 70 (the National Electrical Code®) contains electrical installation requirements to protect people from electrical hazards during normal conditions. The requirements in chapter 4 contain sections of the National Electrical Code® that contain installation requirements regarding issues that affect employee safety:

Article 400: General Requirements for Electrical Installations

Article 410: Wiring Design and Protection

Article 420: Wiring Methods, Components, and Equipment for General Use

Article 430: Specific Purpose Equipment and Installations

Article 440: Hazardous (Classified) Locations

Article 450: Special Systems

Summary

The likelihood of an incident with one of your workers involving an electrocution or electric arc flash is significantly reduced by maintaining a safe electrical work environment that includes three major components: proper installation, safe electrical work practices, and an effective ongoing electrical maintenance program.

If you have any questions concerning this article or other safety issues, please contact W. Jon Wallace at 919.933.5548 or email: jwallace@workplacegroup.net.