Implementing an effective NFPA 70E-based electrical safety program can be a daunting task for even the most seasoned safety professional. Regulatory guidance can be vague and because there are two different but equally dangerous hazards, shock and arc flash, safety professionals can easily get their wires crossed. Breaking down the program into a step-by-step process and working through each step will pave the way to a well-designed and effective electrical safety program.

**Step 1: Perform a Shock Hazard Risk Assessment**

OSHA professionals must perform a shock hazard risk assessment in accordance with article 130.4 as well as an arc flash risk assessment as required by article 130.5. Break down the type of work employees are doing and the electrical hazards they are exposed to. Team members performing maintenance, troubleshooting or other tasks may expose energized conductors or circuit parts of 50 V or more. Exposure to these shock hazards requires the use of PPE and additional protective measures.

**Step 2: Perform an Arc Flash Hazard Risk Assessment**

Determine whether this work exposes electrical workers to arc flash hazards. A certain level of electrical energy must be present for an arc flash to develop. Single-phase equipment operating at 120/240 V levels is generally not a concern, however, three-phase electrical equipment operating at 208, 240, 277, 480 V or higher can produce an arc flash, in which case a formal incident energy analysis must be performed by a qualified electrical engineer as required by article 130.5(G) of the standard.

**Step 3: Install Arc Flash & Shock Hazard Warning Labels**

Incident energy is the level of thermal energy developed by an arc flash and is measured in calories per centimeter squared. Employees exposed to even low levels of this thermal energy without proper protection can face life-altering injuries. Arc flash warning labels must display the incident energy levels and other important safety information as determined by the incident energy analysis. In accordance with article 130.5(H), the labels must be affixed to the face of the equipment identified in step two. Qualified employees will use this information to select the appropriate level of PPE and determine the boundary distance necessary to protect other workers in the area.

**Step 4: Train Workers to Recognize Hazards & Develop Safety Plans**

OSH managers must ensure that qualified persons are provided with formal, documented electrical safety training. Not only is this a regulatory requirement, it is paramount that electrical workers be trained to recognize the electrical hazards they may encounter during their daily work activities. Once identified, workers will need training to reduce the associated risks by developing and implementing a safety plan based on the hierarchy of risk controls. This will include selecting and using the correct PPE. A well-designed and implemented training program that follows the guidance of NFPA 70E article 110.2 will be an integral part of any effective electrical safety program.

**Step 5: Obtain, Use & Maintain the Appropriate PPE**

The next step is to obtain PPE that will protect employees from the identified shock and arc flash hazards. Arc flash PPE must be selected using NFPA 70E Table 130.5(G). Shock protection PPE, such as insulating gloves, must be selected based on the voltage level that employees will be exposed to. The PPE must be used whenever the worker may be exposed to an electrical hazard (warning labels help identify this). Article 130.7 provides further guidance. Consult the manufacturer’s specifications to properly maintain each piece of PPE.

**Step 6: Audit to Continually Improve**

NFPA 70E article 110.1(K) requires qualified employees to be field audited annually. When performed correctly, field observations can be an effective tool to improve individual and organizational safety performance. Safety managers need to develop a process that requires managers and supervisors to perform documented safety audits of each qualified worker. Ensure that workers understand the implications of unsafe work practices and are coached on both negative and positive behaviors. Follow NFPA 70E article 110.2(3)(1) and retrain as needed. Perform an analysis to determine the root cause or causes of the noncompliances observed during the field audits. Based on this analysis, safety managers may discover that their training program must place more emphasis on certain concepts or topics, or that procedures are lacking detail and result in misinterpretations. Use the findings of these audits to close gaps and continually improve the overall program.

**References**


Brian Hall is the lead electrical safety instructor for Rozel (www.70econsultants.com). He is an NFPA-certified electrical safety compliance professional with more than 30 years’ experience teaching and implementing electrical safety concepts as either an electrical instructor, industrial maintenance supervisor or qualified journeyman electrician. He is a member of ASSE’s Northern Ohio Chapter.

Jeff Kershner, P.E., is cofounder and managing partner of Rozel. Kershner holds a B.S.E.E. from Kansas State University. He is a member of the Institute of Electrical and Electronics Engineers.