

OSHA & Arc Flash Hazard



“If an arc-flash hazard is present, or likely to be present, then the employer must select and require employees to use the protective apparel.”

U.S. Dept of Labor

Arc flash hazards can result from many factors, including dropped tools, accidental contact with electrical systems, build up of conductive dust, corrosion and improper work procedures. An arc is produced by flow of electrical current through ionized air after an initial flashover or short circuit, resulting in a flash that can cause significant heating and burn injuries to occur.

Electrical and safety industries are acknowledging that arcing faults can:

Release dangerous levels of radiant heat energy capable of causing severe burns and ignition of clothing, which can result in treatment requiring years of skin grafting, rehabilitation and even death.

Spray droplets of molten metal, with the explosion distributing the molten metal and shrapnel produced by the arc over a large area.

Produce blast pressure waves that have thrown workers across the room and knocked them off ladders.

Cause hearing loss from the sound blast related to the arcing fault.

Workers may never regain their quality of life and may even die from exposure to an arc flash event. The Cost of treatment can exceed \$1,000,000/case, along with potential litigation fees, fines, and escalation of insurance. Process losses can also be incurred.

Industry Regulations, Standards and Recommended Practices for Arc Flash:

Historically, the National Electrical Code (NEC) and other safety codes have been primarily concerned with



U.S. DEPARTMENT OF LABOR

Occupational Safety & Health Administration
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Doug Eby
Career Uniforms
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Boise, ID 83705

Dear Mr. Eby:

This is in response to your letter of December 14, 2001 to Ryan E. Kuehmichel, Area Director in Boise OSHA Area Office, that was rerouted to my attention.

In your letter you requested clarification of OSHA's position concerning requirements for "fire retardant apparel" and asked the following question:

"Does OSHA enforce the National Fire Protection Association NFPA 70E Standard for Electrical Safety Requirements for Employee Workplaces 2000 Edition?"

Discussion

The OSHA standard, Electrical Safety-Related Work Practices Final Rule, was published in the Federal Register (55 FR 31984) on August 6, 1990, and codified in 29 CFR 1910.331 through 1910.335. The NFPA 70E, Part II, in effect at the time of the promulgation of the OSHA standard, was evaluated and used as a base standard in the development of the aforementioned OSHA regulations. Clearly, OSHA's safety-related work practices standards were based on an older edition of the NFPA 70E which did not address flame resistant (FR) protective clothing for employees exposed to the hazard of electric arc-flash.

The OSHA standard 29 CFR 1910.132(d), Hazard Assessment and Equipment Selection, requires the employer to evaluate the workplace for hazards. Based on the employer's assessment, the employer must select and require the use of appropriate personal protective equipment (PPE). Part II of the NFPA 70E, 2000 Edition, contains specific requirements and methodology for hazard risk assessment and selection of protective clothing and other PPE. The hazard assessment, selection and use of protective clothing and other PPE is intended to protect employees working in the flash protection boundary and exposed to the hazard of electric arc-flash. The NFPA 70E is a consensus industry standard which presents industry recognition of the arc-flash hazard and the need for protective clothing and PPE.

Conclusion

Though OSHA does not, per se, enforce the NFPA 70E standard, 2000 Edition, OSHA considers the NFPA standard a recognized industry practice. The employer is required to conduct hazard assessment in accordance with 29 CFR 1910.132(d)(1). If an arc-flash hazard is present, or likely to be present, then the employer must select and require employees to use the protective apparel. Employers who conduct the hazard/risk assessment, and select and require their employees to use protective clothing and other PPE appropriate for the task, as stated in the NFPA 70E standard, 2000 Edition, are deemed in compliance with the Hazard Assessment and Equipment Selection OSHA standard.

I hope this information is useful to you. If you need further clarification of this letter, please contact Abe Mutawe, Safety Engineer, of my staff at (206) 553-5930.

Sincerely,

Richard S. Terrill
Regional Administrator

cc: Ryan Kuehmichel, Area Director

**The
Conclusion**

Though OSHA does not, per se, enforce the NFPA 70E standard, 2000 Edition, OSHA considers the NFPA standard a recognized industry practice. The employer is required to conduct hazard assessment in accordance with 29CFR1910.132(d)(1). If an arc-flash hazard is present, or likely to be present, then the employer must select and require employees to use the protective apparel. Employers who conduct the hazard/risk assessment, and select and require their employees to use protective clothing and other PPE appropriate for the task, as stated in the NFPA 70E standard, 2000 Edition, are deemed in compliance with the Hazard Assessment and Equipment Selection OSHA Standard.

protection from fire, electrocution, and shock hazard. Arc flash hazards were not addressed. This is changing.

The 2002 NEC contains requirements for warning labels and the National Fire Protection Association (NFPA) 70E 2000 and Institute of Electrical and Electronics Engineers (IEEE) 1584 2002, provide guidance on implementing appropriate safety procedures.

Although OSHA has not specifically addressed arc flash, existing and new provisions impact how it is addressed:

OSHA 1910.132(d), and 1926.28(a).

OSHA considers NFPA 70E a consensus industry standard for assessing arc flash standards. The employer is responsible to:

1. Assess the hazards in the work place
2. Select, have, and use the correct PPE
3. Document the assessment

OSHA considers Arc Flash assessments that follow NFPA 70E, in compliance with OSHA requirements, and the accepted practice to protect workers from electrical safety hazards.

A Landmark agreement has been forged between OSHA, IBEW and NECA contractors to use NFPA 70E to protect electricians in Columbus, Ohio, which could set the trend for the Nation.

Evaluating Arc Flash Hazards

In analyzing the system it is important to consider several critical factors that can significantly impact

PPE requirements, including system power distribution configuration changes, various plant operating modes, protective equipment selection and settings, working distances, work practices, etc.

Can It Happen at Your Plant? Some Important Statistics...

Five to Ten Arc Flash Explosions occur in electric equipment every day in the U.S (based on statistics compiled by CapSchell, Inc., a Chicago based research and consulting firm that specializes in preventing workplace injuries and death).

Bureau of Labor Statistics data for 1994 show 11,153 cases of reported days away from work due to electrical burns, electrocution/electrical shock injuries, fires and explosions.

The Census of Fatal Injuries noted 548 employees died from the causes of electrical current exposure, fires and explosions out of 6,588 work related fatalities nationwide.

In the US Chemical Industry, 56% of the fatalities that occurred over a 5-year period were attributable to burns, fires and explosions, with many of the ignition sources being related to electrical activity.

In reviewing the requirements it becomes obvious that companies will be required to make Arc Flash Hazard a part of an ongoing, documented safety program.

Implementation of an Arc Flash Hazard Program. A few of the Benefits of a Comprehensive, Coordinated Program:

Developing and Implementing an ongoing arc flash hazard Program (AFH) that meets the new regulations noted in NFPA-70E, IEEE-1584 and the current OSHA Standard 29 could be challenging.

Rule of thumb methods could result in both unnecessary worker exposures to hazards from under protection and significant lost worker productivity due to overprotection.

Industry is recognizing the benefits of obtaining accurate arc flash hazard data. Recently, the PCIC safety committee recommended that arc flash calculations be completed in conjunction with short circuit calculations and protective device

coordination to help ensure that the most accurate arc flash hazard results were achieved.

ESA's own comparisons between EasyPower ArcFlash and the other methods indicate that the use of EasyPower ArcFlash could save companies thousands of dollars annually, per worker, in lost productivity from overprotection while helping ensure proper recommendations for protection are provided.

Some of the requirements of NFPA 70E Standard for Electrical Safety in the Workplace and how EasyPower helps companies address them.

Whether you're a design or facilities engineer, EasyPower can help you quickly assess and determine Arc Flash hazards.

With the click of a mouse you can:

- ◆ Establish settings for all types of protective devices.
- ◆ Verify protective device & arc hazard ratings.
- ◆ Calculate momentary, interrupting and relay currents.

- ◆ Coordinate your entire power distribution system to minimize downtime.
- ◆ Compare multiple Arc Flash calculation methods.
- ◆ Print directly to selected label printers.
- ◆ Provide the information you need to help insure compliance with NFPA and OSHA requirements.

Working in concert, EasyPower ShortCircuit, PowerProtector and ArcFlash give you instant results and help:

- ◆ Develop a more realistic risk assessment to help insure proper personnel safety and increased acceptance of safety requirements by workers as compared to overly conservative blanket rules.
- ◆ Eliminate hours of engineering time.
- ◆ Prevent costly mistakes and assure system availability.
- ◆ Provide automated documentation and labeling.
- ◆ Increase worker productivity through proper specification of gear.

NFPA 70E Requirement	Notes
Arc Flash Hazard Analysis	-Procedures -Flash hazard Analysis -Flash Protection boundary -Energized Work Permit -Personal Protective Equipment (based on expected fault energy)
Up-to-Date Electrical Drawings	-Determine all possible sources before operating circuit disconnecting devices -Lockout/Tagout -Identification of Energy Sources -Maintained Single Line Drawing
Short Circuit Analysis	-Protective Ground Ampacity & Impedance -Conductor Withstand Rating -Protective Device Withstand Rating
Protective Device Coordination	-Circuit Breaker Testing

Here's more help from the experts at ESA.

Practical Solution Guide to Arc Flash Hazards is 160+ pages of pragmatic help so you can find your way to compliance.

The best part is that it is absolutely FREE!

All you have to do is go to the Arc Flash Resource Center at www.EasyPower.com. and ask. **Use Registration CPSB 311** You'll also find information on just about anything relating to Arc Flash including clothing, labeling machines, safety bulletins, FAQs and more!

While you're there check into the engineering support and training options that ESA provides.

