

ARC FLASH: A Critical Safety Issue

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Covered When it Counts

When dealing with arc flashes, your best protection is knowledge.

In an industry where constant contact with dangerous electrical equipment is a necessary evil, it is important to be prepared for every eventuality. One type of hazard comes in the form of arc fault situations from breaching between phases or phase to ground, which, although short in duration, can present some of the greatest risks to electricians working on energized equipment.

When an arcing fault occurs it creates intense energy, which is then released into the space surrounding the electrical equipment in the form of an arc flash of extreme heat that can reach upwards of 35,000 degrees Fahrenheit in less than a second. The arcing fault also creates an arc blast of pressure waves and sound waves.

In addition to the

possibility of burning the person who comes in contact with the arc flash, the heat that is generated has the potential to ignite non-flame resistant synthetic clothing, including polyesters and rayon, or cause the clothing to melt into skin, resulting in second- and third-degree burns or even death. The pressure and sound waves from the flash can also blow eardrums and damage lungs.

To protect against such devastation from arc flash incidents, OSHA mandates the use of personal protective equipment (PPE), including protective clothing, though it does not delineate how best to use it.

on the type or kind of clothing that should be worn when working in particular situations where arc flashes could occur. (NFPA 70E was originally developed in the late 1970s and published in 1979 to provide guidance for workers to



MEETING THE STANDARD

Until the year 2000, when the National Fire Protection Association issued changes to NFPA 70E "Standard for Electrical Safety Requirements for Employee Workplaces," addressing procedures and recommendations for protecting against arc flash, there were no specifics





the amount of energy that could be generated from an arc flash at particular distances from the source. The higher the potential energy is the higher the category and the greater the required thermal protection capabilities.

Electricians working within the Flash

Protection Boundary (the limited approach boundary) need to properly clothe themselves for the hazard risk category.

To assist in that, NFPA 70E includes a second chart that serves as a personal protective clothing

matrix, indicating the type of clothing and/or the number of layers to be worn for protection for each risk category. It also

includes the total weight range of the clothing material for maximum protection and the required minimum arc rating of PPE calculated in calories per centimeter squared (cal/cm^2), with the calories correlating to the heat factor and the centimeters reflecting the distance from the energized part.

Untreated cotton, wool,

rayon, silk or blends of those materials are non-melting flammable materials that are acceptable for High Risk Category 0, for use up to 2 cal/cm^2 incident energy exposure. For higher risk categories, at least some fire resistant clothing is required.

Protective fire resistant clothing is made up of one or more layers and has different thicknesses of material, designed to protect against various exposures. Arc flash clothing is available, typically, with Arc Thermal Performance Value (ATPV) from 8-100 cal/cm^2 . All the clothing is required to have labeling that states the arc rating, as well as indicate that the item meets ASTM F 1506 requirements.

“Electricians should wear clothing that most closely matches need, as long as it meets or exceeds the exposure.

A worker should never work on energized equipment that has an exposure of over 40 cal/cm^2 ,” says Mastrullo.

The clothing protects the worker from an arc explosion and the resulting heat, but not from electrical shock. Non-conductive gloves, rated into six classes based on voltage, protect the wearer from shock.



satisfy compliance with OSHA requirements on electrical safety.)

The latest edition of NFPA 70E includes requirements for basic protective clothing and PPE for protection against arc flash in various categories of electrical work, based on the risk of arc flash and arc blast at the worksite.

“Qualified personnel must perform a hazard risk analysis of each task at the worksite to determine the level of protection needed,” notes Ken Mastrullo, senior Electrical specialist and staff liaison for NFPA 70E. “The analysis is the responsibility of the employer.”

NFPA provides tables to assist the user in determining protective schemes. These tables assign hazard risk categories, 0 to 4, that reflect

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