



Employee Safety

## The Development of Arc Flash Suit Fabrics: Flame Resistant PPE for Electrical Hazards

Roland Jones | Jun 25, 2020

An arc flash incident is a potentially deadly workplace accident that can cause severe damage in seconds. Here’s what you need to know about PPE designed to protect you from these electrical hazards.

An arc flash can occur in just a fraction of a second, but its impact can often be long-lasting.

These electrical explosions happen when a flash of “electric current leaves its intended path and travels through the air from one conductor to another, or to ground,” *notes OSHA*. For those caught in the arc flash, their injuries, if they don’t prove to be fatal, can include severe burns, concussion, blindness, hearing loss or wounds caused by flying shrapnel.

“It’s not uncommon for an injured employee to never regain their past quality of life,” according to OSHA, with extended medical care often required, sometimes “costing in excess of \$1,000,000.”

There are 30,000 arc flash incidents in the U.S. each year that result in 2,000 hospitalizations and 400 fatalities, according to *Industrial Safety & Hygiene News*. And while some may assume that electrocution is the most common form of injury related to electrical work, 80 percent of electrical worker fatalities are due to burns, not shock, according to the report.

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OSHA

Aside from the important human injury toll, these electrical explosions can cost companies millions in medical costs, equipment replacement or repair, or litigation expenses.

The good news is that these injuries can be mitigated by training your employees about best practices for handling electrical hazards and by providing them with the best personal protective equipment, or PPE.

## Lightweight FR Clothing Adds Comfort and Style to PPE

PPE designed to protect workers from arc flash incidents has changed significantly over the past several years. Today's flame-resistant (FR) clothing allows for greater comfort, style and protection thanks to the development of new synthetic blends.

While regular clothing will continue to burn when ignited by a fire, leading to severe and sometimes fatal injuries, new protective FR clothing does not continue to burn once a fire source is snuffed out, thereby reducing your risk of sustaining burns, or preventing any burns you do sustain from becoming too severe.

Modern FR clothing is also more comfortable and lightweight than in the past. Breathable fabrics help the body's heat to escape, keeping workers cooler and more comfortable in warmer months, and helping them to avoid heat exhaustion. A case in point is ***MCR Safety's vented FR clothing***, which includes work shirts that incorporate venting on the back and under the arms, ensuring the regulation of body heat and allowing for the expelling of dangerous gases if a fire occurs.

***Read more: PPE Assessment Plan: Selecting the Best Type for Your Business***

Generally speaking, there are two basic kinds of FR fabrics that are arc-rated.

Treated FR fabrics start out as fabrics that are flammable (cotton, for example) and then are treated with a flame-retardant chemical to create flame resistance. Inherently flame-resistant fabric, on the other hand, is made from fibers that have their own flame-resistant chemical structure that means they will not burn. Blended fabrics are made by using a combination of both treated and inherently flame-resistant fabrics knitted together so that they have combined properties, usually in order to be both lightweight and durable.

Both types of fabrics must be designated arc-rated with a measurement from either an ***Arc Thermal Performance Value (ATPV)*** test or an ***Energy Break-Open Threshold (EBT)*** test, where the material is tested for exposure to an electrical arc and given a value according to how well it performs. The ATPV and EBT of the material are determined in a single test and the lowest value is used to decide the garment's arc rating.

While treated FR fabrics were once thought to lose their flame resistance with repeated laundering, these days a worker wearing FR clothing made from inherent or treated fabric will remain similarly protected as long as they follow the fabric's laundering guidelines.

## The Evolution of Arc Flash Protection

Many arc flash incidents happen because workers are not following the correct procedures when working on energized units.

The National Fire Protection Association (NFPA) has developed an ***NFPA 70E*** document titled "Standard for Electrical Safety in the Workplace," a resource designed to help companies reduce exposure to fire-related risks and occupational injuries and fatalities.

The standard includes guidance on PPE use to reduce or avoid injury from an arc flash accident. It also includes guidance for employers who want to minimize the risk of working with live electrical equipment, such as how to create a safety program, gauging arc flash hazards, and training for workers on arc flash hazards and safe work procedures.

***Read more: 5 Tips That Help Improve the Safety of Arc Flash PPE***

Companies perform an arc flash analysis of their equipment to determine incident energy levels and

the appropriate arc flash PPE categories for working on the equipment. For example, PPE level 2 requires workers to wear, among other protective items, an arc-rated long-sleeved shirt, long pants or arc-rated coveralls, and insulating gloves with protectors.

The construction of arc flash suits has evolved over the past several years thanks to regular safety guideline updates from OSHA and the NFPA. While arc flash suits can't fully protect you from the harms of an arc flash, they can play a significant part in reducing the harm done by electrical arc flashes.

Of the commonly known fabrics in wide use is **Nomex**, which was introduced by DuPont in 1967. Inherently flame-resistant, with protection built into the fiber itself, Nomex—and DuPont's newer Protera fabric, which is a blend of Nomex and Kevlar—offers protection from arc flash incidents. Although the fabrics burn when you hold a flame next to them, they will stop burning as soon as the flame is removed. The woven structure of synthetic fibers in both fabrics makes them poor conductors of heat and electricity, and therefore ideal for insulating against arc flashes.

Protera fabric is newer than Nomex and designed specifically as a lightweight protective fabric for arc flashes, yet it is durable thanks to the inclusion of Kevlar, a high-strength fiber used in bulletproof vests.

Protera's benefit is that it can be layered with other PPE to ensure comfort when working on category three and four level tasks—the higher danger levels of required arc flash protection—which tend to require heavier grades of PPE, and so may not be ideal for, say, summer work in Southern U.S. states where it tends to be hotter.

While PPE is important, so is good electrical safety training. A well-trained workforce, combined with frequent maintenance and inspection of your equipment for arc flash susceptibility, can greatly reduce the likelihood of an arc flash incident ever happening.

Companies such as Martin Technical offer practical safety training, including classes on **electrical safety and arc flash training** that are based on NFPA 70E, OSHA and industry best practices.

***CLICK HERE to explore product solutions that help maintain a safer workplace while working with electricity.***

***How does your company manage the danger of arc flash injuries?***

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