



*70E Protective  
Apparel  
Frequently  
Asked  
Questions*



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# NFPA 70E STANDARD & FREQUENTLY ASKED QUESTIONS

“Flame Resistant protective apparel can mean the difference between minor survivable burns and major life threatening injuries.”



## NFPA 70E - STANDARD FOR ELECTRICAL SAFETY REQUIREMENTS FOR EMPLOYEE WORKPLACES

National Fire Protection Association (NFPA) Standard 70E, 2009 Edition, became effective September 5, 2008. This American National Standard addresses electrical safety requirements for activities such as operation, repair or demolition of exposed energized electrical conductors or circuit parts. This standard covers virtually all aspects of workplace electrical safety, recognizing hazards associated with the use of electrical energy, and taking precautions so that hazards do not cause injury or death.

The 2009 Edition eliminated Chapter 4 on Installation Safety Requirements because it was a duplicate of National Electrical Code installation requirements. Other changes addressed host employer/contract employer responsibilities. The host employer is responsible for advising the contractor of known hazards and other information about the work site. The contractor employer is responsible for instructing his/her employees in the hazards communicated by the host employer and for ensuring that the contract employees follow required rules and work practices.

The employer must implement and document an overall electrical safety program that directs activity appropriate for the voltage, energy level and circuit conditions. This includes hazard/risk evaluation and job briefing procedures and must be audited annually. Employees must be qualified to do the work and trained to understand the specific hazards and potential injury associated with electrical energy. Employees exposed to shock hazards must be retrained annually in cardiopulmonary resuscitation.

FOR MORE INFORMATION ON 70E VISIT: [WWW.NFPA.ORG](http://WWW.NFPA.ORG)

## ▶ WHAT EMPLOYERS NEED TO KNOW

NFPA is a national consensus standard that establishes “best practices” for protection from electric arcs.

Employers must conduct both shock and flash hazard analysis to establish a flash protection boundary.

If energized electrical conductor or circuit parts operating at 50 volts or more are not placed in an electrically safe work condition within the Limited Approach Boundary, written authorization by work permit is required. In addition to a description of the circuit and equipment, other requirements must be implemented including Lockout/Tagout devices, a shock hazard analysis and a flash hazard analysis. An exception for the work permit requirement was added for tasks involving “visual inspection”.

When work will be performed within the Flash Protection Boundary, the employer must document the incident energy exposure in calories per square centimeter. Arc rated clothing and PPE must be worn either based on the incident energy determined for the specific task or by using Table 130(C)(9) to determine the hazard/risk category. Job briefing procedures and must be audited annually.

Annex H provides a simplified approach to select appropriate arc rated clothing and PPE based on whether the task requires “everyday work clothing” or “electrical switching clothing”.

### THREE STEPS TO COMPLIANCE WITH NFPA 70E:

- Implement and document an overall electrical safety program, including hazard/risk evaluation and job briefing procedures. Audit the program annually.
- Determine PPE based either on the incident energy determined for the specific task or by using Table 130(C)(9).
- Select PPE matching the hazard to the arc rating of the garments.

## ▶ THREE STEPS TO COMPLIANCE WITH NFPA 70E

### IMPLEMENT AND DOCUMENT AN OVERALL ELECTRICAL SAFETY PROGRAM

The employer must implement and document an overall electrical safety program that directs activity appropriate for the voltage, energy level and circuit conditions. This includes hazard/risk evaluation and job briefing procedures and must be audited annually. Employees must be qualified to do the work and trained to understand the specific hazards and potential injury associated with electrical energy. Employees exposed to shock hazards must be retrained annually in cardiopulmonary resuscitation.

### DETERMINE PPE BASED INCIDENT ENERGY TASK, OR FROM TABLE 130.7(C)(11):

HAZARD RISK CATEGORY	CLOTHING DESCRIPTION	REQUIRED MINIMUM arc rating of PPE cal/cm <sup>2</sup>
<b>HRC1</b>	Arc-rated FR shirt and FR pants or FR coverall	4
<b>HRC2</b>	Arc-rated FR shirt and FR pants or FR coverall	8
<b>HRC3</b>	Arc-rated FR shirt and pants or FR coverall, and arc flash suit selected so that the system arc rating meets the required minimum	25
<b>HRC4</b>	Arc-rated FR shirt and pants or FR coverall, and arc flash suit selected so that the system arc rating meets the required minimum	40

NOTE: Arc Rating can be either ATPV or E<sub>BT</sub>.

## ▶ SELECT PPE

Employees must wear arc rated clothing wherever there is a possible exposure to an electric arc flash above the threshold incident-energy level for a second-degree burn [1.2 cal/cm<sup>2</sup>]. Conductive items such as jewelry, necklaces, etc. may not be worn where they present a contact hazard. Clothing made from synthetic materials that melt such as nylon, polyester, polypropylene and Spandex may not be used unless such blends meet the requirements of ASTM F 1506 and do not exhibit melting and sticking during arc testing.

Be aware that other PPE may be required for specific tasks including hearing protection, voltage-rated tools and gloves, etc.

## ▶ WHAT EMPLOYERS NEED TO KNOW

### + WHO IS COVERED?

Employees during activities such as operation, maintenance and demolition of exposed energized electrical conductors or circuit parts. Research shows that approximately 10% of the employees in any operation work as electricians, maintenance, or other categories of work covered by this standard.

### + DOES OSHA ENFORCE NFPA 70E?

OSHA believes that the NFPA 70E standard offers useful guidance for employers and employees attempting to control electrical hazards, but OSHA has not conducted a rule making and therefore does not "enforce" NFPA 70E. OSHA does use consensus standards, such as NFPA 70E as evidence of hazard recognition in evaluating General Duty Clause violations.

### + WHERE CAN I GET A COPY?

NFPA 70E is available from NFPA, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9109; phone 1-800-344-3555; on-line at: <http://catalog.nfpa.org>.

### + WHAT IS ATPV; E<sub>BT</sub>?

The standard requires that arc rated garments have a minimum Arc Thermal Performance Value (ATPV) based on the hazard/risk analysis for the task being performed. The ATPV is expressed in calories per square centimeter and represents the protection from electric arcs provided by the garment. If the ATPV cannot be calculated because the fabric breaks open, the energy causing the break open is expressed as the Breakopen Threshold Energy (E<sub>BT</sub>).

### + WHERE DO I FIND ARC RATINGS?

Arc ratings are included on Bulwark garment labels and in the Bulwark catalog and Wholesale Product Guide. This information is also available on line at [www.bulwark.com](http://www.bulwark.com).

### + MY CUSTOMER HAS DONE THEIR CALCULATIONS AND SOME TASKS REQUIRE A HIGHER LEVEL OF PROTECTION THAN IS AVAILABLE FROM SINGLE LAYER GARMENTS. WHAT DO I OFFER THEM?

The total system arc rating of layered ensembles must be determined by a multilayer arc test on the

combination of all layers assembled as they would be worn, rather than adding the arc ratings of the individual layers. Arc ratings of individual layers cannot simply be added together. Any garment worn as the outer layer, including rain wear, must be FR. Electrical switching clothing (flash suits) is available for those needing HRC 3 (25 minimum ATPV) or HRC 4 (40 minimum ATPV). Many insulated outerwear garments also have ATPVs greater than 25. These can be used for specific applications where higher arc ratings are needed. Keep in mind that hearing, head, face and neck protection are also required for these higher exposure levels.

### + THERE ARE SOME REALLY COMPLEX CALCULATIONS IN 70E. DO I HAVE TO BECOME AN ELECTRICAL ENGINEER TO UNDERSTAND THE STANDARD?

Arc rated clothing and PPE must be worn either based on the calculated incident energy determined for the specific task or by using Table 130(C)(9) to determine the hazard/risk category (HRC). HRC is specified based on specific job tasks. These range from HRC 0 that allows non-melting flammable materials up to HRC 4 that requires an arc rated FR shirt and pants or FR coverall, and arc flash suit with a minimum system arc rating of 40.

### + CAN'T THOSE COVERED BY THIS STANDARD JUST WEAR HEAVYWEIGHT NON-MELTING FLAMMABLE GARMENTS SUCH AS DENIM JEANS?

Probably not. Non-melting flammable garments are only allowed for HRC 0 exposures. Employees must wear FR clothing wherever there is a possible exposure to an electric arc flash above the threshold incident-energy level for a second-degree burn (1.2 cal/cm<sup>2</sup>).

### + CAN WORKERS CONTINUE TO WEAR FLAMMABLE T-SHIRTS UNDER THEIR ARC RATED GARMENTS?

Layering of non-melting flammable garments is permitted to be worn under FR garments for added protection. However, if Table 130.7(C)(9) is used to determine the HRC category, only FR layers within the layered system are used to determine system arc rating.

Information sourced from Bulwark Protective Apparel - Compliance Made Easy

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