

## IMPORTANT SAFETY INFORMATION FOR PPE

### ARC PROTECTION CLOTHING REQUIREMENTS

OSHA 29 CFR 1910.269 (l)(6)(iii) "The employer shall ensure that each employee who is exposed to the hazards of flames or electric arcs does not wear clothing that, when exposed to flames or electric arcs, could increase the extent of injury that would be sustained by the employee."

Clothing made from acetate, nylon, polyester and rayon either pure or blended should not be worn when working in hazardous environments. (see videos showing this hazard at [www.oelsales.com](http://www.oelsales.com))

Clothing made from 100% cotton or wool must be determined acceptable for the conditions the worker will be exposed to. Clothing made from flame-resistant materials, that meet current ASTM F1506, is acceptable.

ASTM F1506 details the specifications of a textile to be used by an electrical worker as a means of electrical arc protection. A garment must include a label, which states the following information: Tracking I.D. Code, Meets ASTM F1506, Manufacturer's name, Care Instructions & Fiber Content, Size, and "Arc Rating" - ATPV or EBT.

ASTM F2178 is the test method used to measure arc rated products intended to protect the face of workers exposed to electrical arcs.

### DANGERS OF ARC FLASH

Even relatively low voltages can be fatal. For example, electrical shocks produced from common 60 hz AC power passing from hand to foot for a duration of one second can have the following effects:

#### Effects of Electrical Shock

Current	Effects
1-3Milliamps	Tingling Sensation
3+Milliamps	Shock (pain)
10+Milliamps	Muscular Contractions (can't let go)
30+Milliamps	Respiratory Paralysis (may be fatal)
60+Milliamps	Ventricular Fibrillation (usually fatal)
4+Amps	Heart Paralysis (fatal)
5+Amps	Tissue Burning (fatal, vital organs destroyed)

### ALWAYS PERFORM A HAZZARD ASSESSMENT

The NFPA 70E Standard for Electrical Safety in the Workplace requires employers to perform an Electrical Arc Hazard Assessment. Each situation is unique and needs to be evaluated on its own merits. ASTM F1959 details the standardized test that must be used to determine the thermal protective value of textiles in an electric arc application.

Clothing selected for a particular application shall have an arc thermal performance value of (EBT or ATPV) higher than the potential hazard to prevent the onset of 2nd degree burns.

### VISIT OUR WEBSITE FOR:

- Reviewing our up to date Tool Catalog
- Reviewing our new ARC Flash Clothing Catalog
- Witnessing our stunning ARC Flash Videos
- Reading up on the latest OSHA rules and regulations





10 cal FR T-shirts  
Short & Long Sleeve

Cat. No.	Description
AFWSS10	10 cal/cm2, orange - Short Sleeve
AFWLS10	10 cal/cm2, orange - Long Sleeve

## NAVIGATING THE ROAD TO OSHA COMPLIANCE

### DANGERS OF ARC FLASH

Even relatively low voltages can be fatal. For example, electrical shocks produced from common 60 hz AC power passing from hand to foot for a duration of one second can have deadly effects. The workers below are all in grave danger. The proper PPE will protect each one of them.



Can you tell your service or maintenance workers what type of PPE (Personal Protective Equipment) they should be using?

Are they using:

- Approved Rubber Gloves
- Proper Eye and Face Protection
- Proper Fire Retardent Clothing

Everyday 3-4 people are killed in an electrical related work injuries in America.

**Arc Flash:** An arcing fault is the flow of current through the air between phase conductors or phase conductors and neutral or ground. An arcing fault can release tremendous amounts of concentrated radiant energy at the point of the arcing in a small fraction of a second resulting in extremely high temperatures, a tremendous pressure blast, and shrapnel hurling at high velocity.

**ASTM:** American Society for Testing and Materials

**Arc Thermal Performance Value (ATPV):** This value is presented in calories per square centimeter and represents the maximum capability for arc flash protection of a particular garment. This rating also applies to fabrics, however, a garment made from more than one layer of arc flash rated fabric will have a calorie per square centimeter rating greater than the sum of the ATPV ratings of the original fabrics.

The calories per square centimeter rating of most arc flash protection suits, coveralls, and coats is commonly sewn into the fabric in large letters on the outside of the garment.

**Calories per Centimeter Squared (cal/cm<sup>2</sup>):** This is a number identifying the amount of energy that can be delivered to a point at a particular distance from an arc flash. Once this value is known, the ATPV rating of the flash clothing required for work at that distance from the potential flash hazard is also known. See ATPV.

**Calorie:** A calorie is the energy required to raise one gram of water one degree Celsius at one atmosphere. The onset of second-degree burns may occur at 1.2 calories per centimeter squared per second. One calorie per centimeter squared per second can be equal to holding your finger over the tip of the flame of a cigarette lighter for one second.

**De-energized:** Free from any electrical connection to a source of potential difference and from electrical charge; not having a potential different from that of the earth.

**Electrical Hazard:** A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.

**Electrical Safety:** Recognizing hazards associated with the use of electrical energy and taking precautions so that hazards do not cause injury or death.

**Electrically Safe Work Condition:** A state in which the conductor or circuit part to be worked on or near has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to ensure the absence of voltage, and grounded if determined necessary.

**Flame-Resistant (FR):** The property of a material whereby combustion is prevented, terminated, or inhibited following the application of a flaming or non-flaming source of ignition, with or without subsequent removal of the ignition source.

**Flash Hazard:** A dangerous condition associated with the release of energy caused by an electric arc.

**Flash Hazard Analysis:** A study investigating a worker's potential exposure to arc-flash energy, conducted for the purpose of injury prevention, the determination of safe work practices, and the appropriate levels of PPE.

**Flash Protection Boundary:** An approach limit at a distance from exposed live parts within which a person could receive a second degree burn if an electrical arc flash were to occur.

**Flash Suit:** A complete FR clothing and equipment system that covers the entire body, except for the hands and feet. This includes pants, jacket, and bee-keeper-type hood fitted with a face shield.

**Hazard Risk Category (HRC):** Categories defined by NFPA 70E-2004 to explain protection levels needed when performing tasks. The values range from -1 to 4. ATPV rated PPE is required for categories 1 through 4 as follows:

• Category 1: 4 cal/cm<sup>2</sup> • Category 2: 8 cal/cm<sup>2</sup> • Category 3: 25 cal/cm<sup>2</sup> • Category 4: 40 cal/cm<sup>2</sup>

**IEEE:** The Institute of Electronics and Electrical Engineers (IEEE) (Note: IEEE1584 - 2002 Guide to Performing Arc-Flash Hazard Calculations).

**Incident Energy:** The amount of energy impressed on a surface, a certain distance from the source, generated during an electrical arc event. One of the units used to measure incident energy is calories per centimeter squared (cal/cm<sup>2</sup>).

**Limited Approach Boundary:** An approach limit at a distance from an exposed live part within which a shock hazard exists.

**NEC The National Electrical Code:** The NFPA Standard 70-2005 "The National Electrical Code" (NEC) (Note: paragraph 110.16 contains requirements for warning labels).

**NFPA:** The National Fire Protection Association.

**NFPA 70E Standard:** Standard that provides guidance on implementing appropriate work practices that are required to safeguard workers from injury while working on or near exposed electrical conductors or circuit parts that could become energized.

**OSHA:** Occupational Safety and Health Administration.

**OSHA 29 CFR 1910, Subpart S-Electrical:** Occupational Safety and Health Standards. Section 1910 Subpart S-Electrical Standard number 1910.333 specifically addresses Standards for Work Practices.

**Prohibited Approach Boundary:** An approach limit at a distance from an exposed live part within which work is considered the same as making contact with the live part.

**Restricted Approach Boundary:** An approach limit at a distance from an exposed live part within which there is an increased risk of shock, due to electrical arc over combined with inadvertent movement, for personnel working in close proximity to the live part.

**Shock Hazard:** A dangerous electrical condition associated with the possible release of energy caused by contact or approach to energized parts.

**Voltage, Nominal:** A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class. The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

**Working Near (live parts):** Any activity inside a limited approach boundary.

**Working On (live parts):** Coming in contact with live parts with the hands, feet, or other body parts, with tools, probes, or with test equipment, regardless of the personal protective equipment a person is wearing.

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