



## **ASTM F1506 - 20a: Standard Performance Specification for Flame Resistant And Electric Arc Rated Protective Clothing Worn by Workers Exposed to Flames and Electric Arcs**

### **Purpose:**

- To help protect workers in electrical workplaces from experiencing severe thermal burns.
- Initiated in response to what was originally believed to be injuries resulting from an electrical burn but found instead to be thermal burns resulting from electric arc flash. This was part of the realization of how the clothing typically worn in these incidents, was often hazardous by contributing more to burn severity than would have the arc flash itself. Now it's appreciated how clothing can be engineered to not be hazardous, and instead protective in arc incidents. (Note: Engineering clothing from being a significant contributor to burn severity, to instead being protective is conceptually similar to that done in the FR clothing standards NFPA 2112 and CAN/CGSB-155.20)
- Helps ensure compliance with the USA's OSHA 1910.269, and other jurisdiction's regulatory requirements.
- In response to COVID-19 and limiting community spread biological hazards, a special category has been added for FR Cloth Face Coverings (FRCFC). Special labelling requirements are provided due to their size, as well as a caution that these do not provide any level of arc flash protection to the head, face, and neck and instead that is specified by the PPE standard ASTM F2178.
- (Note: ASTM F1506 does not address arc rated rainwear. AR rainwear is specified by the ASTM F1891 Arc and Flame Resistant Rainwear standard available at: [www.astm.org/f1891-19.html](http://www.astm.org/f1891-19.html))

### **Use/Application:**

- ASTM F1506 is the arc rated (AR) personal protective equipment (PPE) clothing standard specified by workplace electrical safety standards including:
  - CSA Z462-2021, Workplace Electrical Safety Standard [www.csa.ca](http://www.csa.ca)
    - (Table 5, Apparel – Arc-rated: ASTM F1506)
  - NFPA 70E-2021, Standard for Electrical Safety in the Workplace® [www.nfpa.org](http://www.nfpa.org)
    - (Table 130.7 © (14), Clothing – Arc-rated: ASTM F1506)
  - CAN/ULC S801 Standard on Electric Utility Workplace Electrical Safety for Generation, Transmission and Distribution [www.scc.ca/en/standardsdb/standards/25740](http://www.scc.ca/en/standardsdb/standards/25740)

### **Compliant Arc Rated Clothing:**

- Is labelled to ASTM F1506, and with its AR clothing labelling requirements including:
  - Clearly stating “Meets requirements of Performance Specification F1506”
  - Providing the garment's arc rating (i.e., 6.3, 8.4, 12 cal/cm<sup>2</sup> etc.) identified as either an ATPV or Ebt.
  - Providing identification and traceability requirements including the manufacturer's name or tracking code, fabric identification and garment style etc.

### **Non-Compliance Issues Includes Those:**

- Using incorrect arc ratings such as IEC 61482 ASTM F1959's arc ratings, instead of ASTM F1506's ASTM F1959/F1959M arc ratings.
- Using made up, false and misleading garment labels such as those claiming the clothing complies with one of the electrical workplace standards i.e. NFPA 70E and/or CSA Z462. Note: these electrical workplace standards do not provide garment labelling requirements, instead they specify what PPE standard must be complied with, and then these PPE standards -including ASTM F1506, specify their own specific labelling requirements.



# APPAREL SOLUTIONS

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## **Garment Design Requirements Include:**

- Metal fasteners or closures, i.e., snaps, buttons, zippers, have a layer of thermally insulating AR/FR protective fabric between them, and the inner (skin) side of the garment.
- Non flame resistant (FR), heraldry i.e., exterior logos, crests, name tags, and flag patches, are recommended to at maximum, have an individual size of 16 inches<sup>2</sup> and total area of 40 inches<sup>2</sup>.

## **Garment Component Performance Tests Include:**

- Thread used in garment construction be inherently flame resistant, and not melt.
- All slide fastener tape (material "zipper" teeth are attached to) be inherently flame resistant.
- Hardware, if visible on the outside of the garment, be tested for heat resistance and "shall remain sufficiently functional to allow the garment to be removed".
- Visibility enhancements be FR. High visibility striping/trim be tested for flame resistance, and either certified to NFPA 2112, or tested at least once every six months. (Note: Early ASTM F1506 editions did not include this requirement)
- Fabric flammability and flame resistance (FR) test requirements -depending on garment labelling, include testing most fabrics before and after a minimum of 25 launderings and/or dry-cleanings. The test procedure allows for a maximum after-flame time of 2 seconds, char length of 152 mm (6 inches), and no melting or dripping. However, some non-woven fabrics can be tested "as received", and after no, or only 5 launderings.
- The final test -after the flame resistance requirements have been complied with, is to determine the clothing's arc rating. For this, specimen samples of the FR protective fabric(s) -not garments, mounted in panels and ASTM F1506 ASTM F1959/F1959M tested for their arc rating:
  - Single layer garments (i.e., shirts, pants, summer coveralls), have a single layer of the FR fabric used in the garment's construction arc rating tested.
  - Multilayer garments (i.e., lined jackets, insulated parkas) have all their FR fabrics/materials layered together in the order used in the garments, and arc rating tested. Note: This is the arc rating test procedure specified by NFPA 70E and CSA Z462 for clothing system arc ratings, and what some also call total system arc ratings (TSAR).
  - ASTM F1959/F1959M testing demonstrates how changing the order of the layered materials can significantly impact the clothing system's arc rating.
  - Arc ratings depending on which occurs first, are to be expressed, identified as either:
    - An arc thermal performance value (ATPV), when the incident energy on a material(s) is predicted with a 50% predictability, to result in sufficient heat transfer to cause the onset of a second-degree skin burn injury, or
    - Breakopen threshold energy (EBT or Ebt), when the incident energy on a material(s) is predicted with a 50% predictability, to result in breakopen before the onset of a second-degree skin burn injury.

## **Tip**

Those requiring AR clothing that will also comply with FR clothing standards including NFPA 2112 and CAN/CGSB 155.20, when examining fabrics and clothing for desirable arc ratings also ensure these will also comply with the FR standards and their "tougher" flame resistance and garment certification requirements.

To ensure you have the actual requirements of this AR clothing PPE standard we recommend downloading the latest edition @ [www.astm.org/Standards/F1506.htm](http://www.astm.org/Standards/F1506.htm)