APPAREL SOLUTIONS
Transforming Safety Apparel

18030 107 Avenue
Edmonton, AB
T5S 1P4

Ph: 1 - 780 - 434 - 6100
Fx: 1 - 866 - 291 - 5968

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 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 instead found to be thermal burns resulting from electric arc flash. It was then recognized that flammable clothing typically worn often contributed more to burn severity than the electric arc flash would have. Now it's understood arc rated (AR) flame resistant (FR) clothing must not contribute to burn severity, but instead provide thermal protection in an electric arc flash. (Note this standard to be similar to the initiation of the FR clothing PPE standards CAN/CGSB-155.20 and NFPA 2112.)
- Helps ensure compliance with USA's OSHA 1910.269 regulatory requirements, as well as those for an increasing number of international jurisdictions.

Use/Application:

- ASTM F1506 is the personal protective equipment (PPE) standard specified for arc rated (AR) clothing* by workplace electrical safety standards including:
    - CSA Z462-2021, Workplace Electrical Safety Standard www.csa.ca
        - (Table 5, Apparel – Arc-rated: ASTM F1506)
    - NFPA 70E-2021, Standard for Electrical Safety in the Workplace® www.nfpa.org
        - (Table 130.7 (C) (14), Clothing – Arc-rated: ASTM F1506)
    - CAN/ULC S801Standard on Electric Utility Workplace Electrical Safety for Generation, Transmission and Distribution www.scc.ca/en/standardsdb/standards/25740

*ASTM F1506 does not address arc rated rainwear. AR rainwear/raingear is specified by the ASTM F1891 AR/FR rainwear PPE standard. https://www.astm.org/Standards/F1891.htm

AR/FR Clothing Incorrectly Labelled NFPA 70E, CSA Z462, etc., Compliant:

- Does not have the required ASTM F1506 PPE AR clothing labeling. This labelling must include "meets requirements of Performance Specification ASTM F1506", arc rating identified as either an ATPV or Ebt, and basic PPE clothing labelling requirements including garment manufacturer's name, fabric identifier, garment tracking & identification code, style and size. Note: The electrical workplace safety standards do not include clothing labelling specifications.
- Does not meet or exceed the garment fabric's flame resistance requirements. The result is this clothing could lose its flame-resistant properties and become flammable after a few, or even a single laundering, resulting in a potentially hazardous garment.
- Provides arc ratings for different fabric than that used in the garment.
- While possibly being compliant with some international electrical standards, are not compliant with ASTM F1506. This can include IEC 61482's ASTM F1959 arc ratings, that are different than ASTM F1506's ASTM F1959/F1959M arc ratings.

APPAREL SOLUTIONS
Transforming Safety Apparel

18030 107 Avenue
Edmonton, AB
T5S 1P4

Ph: 1 - 780 - 434 - 6100
Fx: 1 - 866 - 291 - 5968

ASTM F1506 -20a AR/FR Clothing Requirements Include Garment Design:

- Metal fasteners or closures, i.e. snaps, buttons, zippers, to have a layer of AR/FR protective fabric between them and the inside of the garment aiding thermal insulation.
- PPE clothing manufacturers are to follow and update a documented quality management system with a minimum annual audit that includes a product recall system.
- Heraldry -Exterior logos, crests, name tags, and flag patches (if not FR), are recommended a maximum individual size of 16 inches^2 and maximum total area of 40 inches^2.
- In response to COVID-19 and limiting community spread of 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.

Garment Component Tests Include:

- Thread used in garment construction must be inherently flame resistant (FR), and not melt.
- All slide fastener tape (The material the "zipper" teeth are attached to that is then attached to the garment) must be inherently FR.
- Hardware, if visible on the outside of the garment, must be tested for heat resistance and “shall remain sufficiently functional to allow the garment to be removed”.
- Visibility enhancements must be flame resistant. High visibility striping/trim must be tested for flame resistance, and either certified to NFPA 2112, or tested at least once every six months. (Note, early editions of ASTM F1506 did not include this requirement.)
- Non-FR Fabric tests include strength, tearing, shrinkage and fading tests. Note, some FR clothing PPE standards omit these. Due to AR/FR clothing PPE manufacturer's warranties believed to better address these garment durability concerns than these tests would.
- Fabric flammability and flame resistance (FR) test requirements* include testing most fabrics before and after a minimum of 25 launderings and/or dry-cleanings – dependent on garment labeling. The test procedure also 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 no launderings or only 5.
- Clothing arc ratings are not determined by testing the garment, but instead by testing specimen samples of the FR protective fabric mounted in panels, and not by using a manikin. One layer of FR fabric is ASTM F1959/F1959M arc rating tested for single layer garments (i.e., shirts, pants, summer coveralls). Multilayer FR fabrics/materials are ASTM F1959/F1959M tested together in the order multilayer (i.e. lined jackets, insulated parkas) are manufactured. This is the same testing procedure specified by NFPA 70E and

18030 107 Avenue
Edmonton, AB
T5S 1P4

Ph: 1 - 780 - 434 - 6100
Fx: 1 - 866 - 291 - 5968

CSA Z462 for clothing system arc ratings. ASTM F1959/F1959M testing demonstrates that changing the order of the layering materials can significantly impact the clothing system arc rating.

  - ASTM F1959/F1959M is a design test, and unlike other testing requirements is only required to be done on the original FR fabric, and when changes are made to that FR fabric.

- Clothing arc ratings are a measurement describing FR fabric/material performance after being exposed to an electric arc, and the predicted (with 50% predictability) thermal protection provided from that exposure. 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 is predicted to result in sufficient heat transfer to result in the onset of a second-degree skin burn injury, or
  - Breakopen threshold energy (EBT), the incident energy on a material that results in breakopen before the predicted onset of a second-degree skin burn injury.

*For comparison, fabric flammability and flame resistance (FR) test requirements for the flash/short duration fire CAN/CGSB-155.20 and NFPA 2112 PPE clothing standards require all protective fabric(s) be tested for flame resistance both before, and after multiple launderings or dry cleanings, and allowed only a maximum 100 mm (4 inch) char length. To further help ensure non-flammable FR PPE clothing NFPA 2112 requires protective fabrics be tested both before and after 100 “industrial” launderings or dry cleanings.

To ensure you see the actual requirements of the following AR clothing PPE standard we recommend downloading the latest edition @ www.astm.org/Standards/F1506.htm.