



Designation: **F2621 – 12 F2621/F2621M – 19**

Standard Practice for Determining Response Characteristics and Design Integrity of Arc Rated Finished Products and Evaluating other Products in an Electric Arc Exposure¹

This standard is issued under the fixed designation **F2621**; **F2621/F2621M**; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice identifies protocols for use in conducting arc testing on finished products intended for use as thermal protection by workers who may be exposed to electric arc hazards.

1.1.1 The practice is also used for other components which can be exposed to electric arc, but which do not require an arc rating.

1.1.1.1 If items are tested and they do not meet the appropriate standard, it is the responsibility of the specimen submitter to provide this information for indication in the test report.

1.2 Arc Rated protective items are typically tested using this practice to evaluate the performance of the interface area between the product and the other arc flash PPE or to evaluate zippers and other findings.

1.3 When evaluating arc rated PPE with non-arc rated PPE for due diligence (such as respirators, etc.), this practice does not result in an arc rating and non-arc rated components or products shall be clearly indicated as having no arc rating.

1.4 This practice is not intended to produce an arc rating and does not replicate in all types of arc exposures.

1.5 This practice is used with the following standards:

1.5.1 Protective fabric materials receive arc ratings from Test Method **F1959/F1959M**.

1.5.2 Face protective products receive arc ratings from Test Method **F2178**.

1.5.3 Gloves receive arc ratings from Test Method **F2675**.

1.5.4 Rainwear materials, findings and closures are specified by Specification **F1891**.

1.5.5 Garments are specified by Specification **F1506**.

1.6 This practice provides procedural guidelines for conducting arc testing on finished products intended for use as thermal protection by workers who may be exposed to electric arcs. The test specimens used in this practice are typically in the form of arc-rated finished products. These arc-rated finished products may include, but are not limited to, single layer garments, multi-layer garments or ensembles, cooling vests, gloves, sleeves, chaps, rainwear, balaclavas, faceshields, and hood assemblies with hood shield windows. Non-arc rated finished products may be included when part of a flame-resistant system, or for evaluating heat transmission through the finished product for incident reenactment, or for evaluation of products needed but not available as arc rated (such as respirators, etc.)

1.1.1 This practice is intended to provide procedural guidelines to improve consistency across testing groups. This practice is not intended to define the end points, parameters, or measures to be studied by the tester.

1.1.2 This practice is supplemental to Test Methods **F1959/F1959M** and **F2178**. Protective materials used to manufacture arc rated finished products shall be tested according to Test Method **F1959/F1959M** prior to being tested according to this practice, and face protective products shall be tested according to Test Method **F2178** prior to being tested according to this practice. Test Methods **F1959/F1959M** and **F2178** provide definitive numeric arc ratings for materials intended for use in finished products worn by workers exposed to electric arcs.

1.1.2.1 Discussion—Face protective products such as face shields and hoods are tested as finished products using Test Method **F2178**. These items may be subsequently tested using this practice in order to determine the performance of the interface area between the face protective product and the arc flash PPE worn on the torso.

1.1.3 The test specimens used in this practice shall be in the form of arc-rated finished products. These arc-rated finished products may include, but are not limited to, single layer garments, multi-layer garments or ensembles, cooling vests, gloves,

¹ This practice is under the jurisdiction of ASTM Committee **F18** on Electrical Protective Equipment for Workers and is the direct responsibility of Subcommittee **F18.65** on Wearing Apparel.

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chaps, rainwear, balaclavas, faceshields, and hood assemblies with hood shield windows. ~~Non-arc rated finished products shall not be used except that flammable under-layers may be included when part of a flame resistant system or for detecting heat transmission level through the finished product and flammable finished products may in some cases be appropriate for incident reenactment.~~

~~1.1.4 The arc rated finished product specimens are new products as sold or products which have been used for the intended purpose for a designated time period.~~

~~1.1.5 Fabrics, fabric layered systems, sewing thread, findings and closures used in arc rated finished products tested under this practice shall meet the requirements of Specification F1506.~~

~~1.1.6 Rainwear materials, findings and closures tested under this practice shall meet the requirements of Specification F1891.~~

1.7 The arc rated finished product specimens are new products as sold or products which have been used for the intended purpose for a designated time.

1.8 This practice ~~shall be~~ is used to ~~measure and describe~~ determine the response characteristics or design integrity of arc-rated materials, products, or assemblies in the form of finished products when exposed to radiant and convective energy generated by an electric arc under controlled laboratory conditions.

1.9 This practice can be used to determine the integrity of closures and ~~seams, seams in arc exposures, the protective performance of arc-rated products in areas where garment overlap occurs or where heraldry is reflective trim or other items are used, and response characteristics such as afterflame time, melting, dripping, deformation, shrinkage, electric arc ignition, or other damage, or combination thereof, of fabrics, systems of fabrics, flammable undergarments when included as part of a system, sewing thread, findings, and closures.~~

~~1.4 This practice can be used to identify the effectiveness of finished product specimens in attenuating heat, sound or pressure waves, or combination thereof.~~

1.10 This practice can be used for incident reenactment, training demonstrations, and material/design comparisons.

1.11 The values stated in either SI units or ~~in other units shall inch-pound units~~ are to be regarded separately as standard. The values stated in each system ~~may~~ are not ~~be necessarily~~ exact equivalents; therefore, to ensure conformance with the standard, each system must ~~shall~~ be used independently of the other, ~~without combining values in any way and values from the two systems shall not be combined.~~

1.12 This standard shall not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire assessment, which takes into account all of the factors, which are pertinent to an assessment of the fire hazard of a particular end use.

1.13 This standard does not purport to describe or appraise the effect of the electric arc fragmentation explosion and subsequent molten metal splatter, which involves the pressure wave containing molten metals and possible fragments of other materials except to the extent that evidence of projectile damage is assessed and reported, ~~and an optional determination of the attenuation of sound or pressure wave, or both, due to the presence of the finished product specimen may be reported.~~

1.14 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate ~~safety~~ safety, health, and health ~~environmental~~ practices and determine the applicability of regulatory limitations prior to use.* For specific precautions, see Section 7.

1.15 This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

[D123 Terminology Relating to Textiles](#)

[D4391 Terminology Relating to The Burning Behavior of Textiles](#)

[D6413 Test Method for Flame Resistance of Textiles \(Vertical Test\)](#)

[F1494 Terminology Relating to Protective Clothing](#)

[F1506 Performance Specification for Flame Resistant and Electric Arc Rated Protective Clothing Worn by Workers Exposed to Flames and Electric Arcs](#)

[F1891 Specification for Arc and Flame Resistant Rainwear](#)

~~[F1958/F1958M Test Method for Determining the Ignitability of Non-flame-Resistant Materials for Clothing by Electric Arc Exposure Method Using Mannequins](#)~~

[F1959/F1959M Test Method for Determining the Arc Rating of Materials for Clothing](#)

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.