



Designation: F1959/F1959M – 14^{ε1}

Standard Test Method for Determining the Arc Rating of Materials for Clothing¹

This standard is issued under the fixed designation F1959/F1959M; 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.

^{ε1} NOTE—"Aerial" was corrected to "areal" in January 2017.

1. Scope

1.1 This test method is used to measure the arc rating of materials intended for use as flame resistant clothing for workers exposed to electric arcs that would generate heat flux rates from 84 to 25 120 kW/m² [2 to 600 cal/cm²s].

1.2 This test method will measure the arc rating of materials which meet the following requirements: less than 150 mm [6 in.] char length and less than 2 s afterflame when tested in accordance with Test Method D6413.

1.2.1 It is not the intent of this test method to evaluate non flame-resistant materials except where used as under layers in multiple-layer specimens.

1.3 The materials used in this test method are in the form of flat specimens.

1.4 This test method shall be used to measure and describe the properties of materials, products, or assemblies in response to convective and radiant energy generated by an electric arc under controlled laboratory conditions.

1.5 The values stated in SI units shall be regarded as standard except as noted. Within the text, alternate units are shown in brackets. The values stated in each system may not be exact equivalents therefore alternate systems must be used independently of the other. Combining values from the systems described in the text may result in nonconformance with the method.

1.6 This test method does not apply to electrical contact or electrical shock hazards.

1.7 *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 This test method 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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1.8 *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 and health practices and determine the applicability of regulatory requirements prior to use. For specific precautions, see Section 7.*

2. Referenced Documents

2.1 ASTM Standards:²

D123 Terminology Relating to Textiles

D1776 Practice for Conditioning and Testing Textiles

D4391 Terminology Relating to The Burning Behavior of Textiles

D6413 Test Method for Flame Resistance of Textiles (Vertical Test)

E457 Test Method for Measuring Heat-Transfer Rate Using a Thermal Capacitance (Slug) Calorimeter

F1494 Terminology Relating to Protective Clothing

2.2 ANSI/IEEE Standard:³

Standard Dictionary of Electrical and Electronics Terms

2.3 AATCC Standard:⁴

AATCC Method 135-2001 Dimensional Changes in Automatic Home Laundering of Woven and Knit Fabrics

3. Terminology

3.1 Definitions:

3.1.1 *ablation, n*—in electrical arc testing, a physical response evidenced by significant erosion or the formation of one or more large holes in a layer of a multilayer system.

3.1.1.1 *Discussion*—Any layer in a specimen (other than the innermost layer) is considered to exhibit ablation when the material removal or any hole is at least 16 cm² [2.5 in.²] in area or at least 8 cm [3.1 in.] in length in any dimension. Single threads across the opening or hole do not reduce the size of the

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.

³ Available from Institute of Electrical and Electronics Engineers, Inc. (IEEE), 445 Hoes Ln., P.O. Box 1331, Piscataway, NJ 08854-1331.

⁴ Technical Manual of the American Association of Textile Chemists and Colorists.