



Standard Test Method for Measuring the Transmitted and Stored Energy of Firefighter Protective Clothing Systems¹

This standard is issued under the fixed designation F2731; 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 test method provides procedures for measuring the combination of transmitted and stored energy that occurs in firefighter protective clothing material systems as the result of exposure to prolonged, relatively low levels of radiant heat.

1.1.1 This test method applies a predetermined compressive load to a preheated specimen to simulate conductive heat transfer.

1.1.2 This test method is not applicable to protective clothing systems that are not flame resistant.

1.1.3 *Discussion*—Flame resistance of the material system shall be determined prior to testing according to the applicable performance and/or specification standard for the material's end-use.

1.2 This test method establishes procedures for moisture preconditioning of firefighter protective clothing material systems.

1.3 The second-degree burn injury used in this standard is based on a limited number of experiments on forearms of human subjects.

1.3.1 *Discussion*—The length of exposures needed to generate a second-degree burn injury in this test method exceeds the exposures times found in the limited number of experiments on human forearms.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are mathematical conversions to English units or other units commonly used for thermal testing.

1.5 *This standard is used to measure and describe the properties of materials, products, or assemblies in response to radiant heat under controlled laboratory conditions but does not by itself incorporate all factors required for fire-hazard or fire-risk assessment of the materials, products, or assemblies under actual fire conditions.*

1.6 *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 limitations prior to use. Specific precautionary information is found in Section 7.*

2. Referenced Documents

2.1 *ASTM Standards*:²

D123 Terminology Relating to Textiles

D1777 Test Method for Thickness of Textile Materials

D3776 Test Methods for Mass Per Unit Area (Weight) of Fabric

F1494 Terminology Relating to Protective Clothing

F1930 Test Method for Evaluation of Flame Resistant Clothing for Protection Against Fire Simulations Using an Instrumented Manikin

2.2 *AATCC Test Methods*:³

AATCC 70 Test Method for Water Repellency: Tumble Jar Dynamic Absorption Test

AATCC 135 Dimensional Changes in Automatic Home Laundering of Durable Press Woven or Knit Fabrics

2.3 *NFPA Standard*:⁴

NFPA 1971 Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting

3. Terminology

3.1 *Definitions*:

3.1.1 *break-open, n*—in testing thermal protective materials, a material response evidence by the formation of a hole in the test specimen.

3.1.1.1 *Discussion*—The specimen is considered to exhibit break-open when a hole is produced as a result of the thermal exposure that is at least 3.2 cm² (0.25 in.²) in area or at least 2.5

¹ This test method is under the jurisdiction of ASTM Committee F23 on Personal Protective Clothing and Equipment and is the direct responsibility of Subcommittee F23.80 on Flame and Thermal.

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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 American Association of Textile Chemists and Colorists (AATCC), P.O. Box 12215, Research Triangle Park, NC 27709, <http://www.aatcc.org>.

⁴ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.