



Designation: D1230 – 22a

Standard Test Method for Flammability of Apparel Textiles¹

This standard is issued under the fixed designation D1230; 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 covers the evaluation of the flammability of textile fabrics as they reach the consumer for apparel. This test method sets forth a classification system for apparel textiles and identifies textiles which have burning characteristics that make them unsuitable for use in clothing, by using as the ignition source a 26-gauge hypodermic needle.

1.1.1 This test method shall be used for the flammability of specific categories of tight fitting children's sleepwear in accordance with 16 CFR 1615 and 16 CFR 1616 which are accessed by the test procedure in 16 CFR 1610 (or ASTM D1230 equivalent).

1.1.2 This test method shall not be used for the evaluation of the flammability of textiles used in children's sleepwear, to which 16 CFR 1615 and 16 CFR 1616 apply. These items are addressed in Test Method **D6545**.

1.1.3 This test method shall not be used for the evaluation of the flammability of decorative fabrics or of textiles not intended for use as apparel. Suitable test methods for such applications include Test Method **D6413/D6413M** or NFPA 701.

1.1.4 This test method shall not be used for the evaluation of the flammability of protective clothing, such as those worn by individuals in the fire service or in other occupations where exposure to heat, flame, or electric arc is likely. Suitable test methods for such applications have been developed by ASTM Committee F23, on Personal Protective Clothing and Equipment.

1.2 This test method is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled 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.

1.3 Fire testing is inherently hazardous. Adequate safeguards for personnel and property shall be employed in conducting these tests.

NOTE 1—This test method is not identical to 16 CFR Part 1610,

¹ This test method is under the jurisdiction of ASTM Committee **D13** on Textiles and is the direct responsibility of Subcommittee **D13.52** on Flammability.

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Flammability of Clothing Textiles. Consumer Product Safety Commission regulations require that clothing fabrics introduced into commerce meet the requirements of 16 CFR Part 1610.

1.4 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *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
D3136 Terminology Relating to Care Labeling for Apparel, Textile, Home Furnishing, and Leather Products
D4391 Terminology Relating to The Burning Behavior of Textiles
D6413/D6413M Test Method for Flame Resistance of Textiles (Vertical Test)
D6545 Test Method for Flammability of Textiles Used in Children's Sleepwear
E176 Terminology of Fire Standards

2.2 AATCC Test Method:³

AATCC Manual of International Test Methods and Procedures
LP 1 Home Laundering: Machine Washing
M11 Glossary of AATCC Standard Terminology

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 27709-2215, <http://www.aatcc.org>.

2.3 CPSC Guidance Document:⁴

16 CFR Part 1610 Standard for the Flammability of Clothing Textiles October 2008

16 CFR Part 1615 Standard for the Flammability of Children's Sleepwear: Sizes 0 through 6X (FF 3-71)

16 CFR Part 1616 Standard for the Flammability of Children's Sleepwear: Sizes 7 through 14 (FF 5-74)

2.4 NFPA Standards:⁵

NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

2.5 ISO Standards⁶

ISO 4880 Burning behaviour of textiles and textile products

ISO 13943 Fire safety

3. Terminology

3.1 The following terms are relevant to this standard: base burn, burn time, combustible textile, dry cleaning, flame application time, flame spread, flame-spread, flame retardant, flame-retardant-treated, flammability, ignition, interlining, laundering, plain surface textile fabric, raised fiber surface, refurbish, surface flash.

3.2 For terms related to burning behavior of textiles, see Terminology **D4391**.

3.3 For terms related to care labels, see Terminology **D3136**.

3.4 For terms related to laundering and drycleaning, see Terminology in the referenced AATCC Manual of International Test Methods and Procedures.

3.5 For terminology related to fire issues other than burning behavior of textiles, see Terminology **E176** and ISO 13943. In case of conflict, the terminology in **E176** will prevail.

3.6 For other terms related to textiles, see Terminology **D123** and AATCC M11.

4. Summary of Test Method

4.1 The test method provides methods of testing the flammability of textiles from or intended to be used for apparel, explains three classes of flammability, sets forth the requirements for classifying textiles, and warns against the use of single or multilayer textile fabrics that have burning characteristics considered by the trade to make them unsuitable for apparel.

4.2 Specimens cut from the textile are prepared by brushing if they have a raised fiber surface. All textiles require testing before and after refurbishing. Refurbishing consists of one cycle of dry cleaning followed by laundering of all textiles. A specimen is inserted in a frame, dried in an oven, and placed in a dessicator before testing. The framed specimen is held in the flammability tester at an angle of 45°, a standardized flame is applied to the surface near the lower end for 1 ± 0.1 s, and the time required for the flame to proceed up the fabric a distance

of $127 \text{ mm} \pm 0.2 \text{ mm}$ (5 in. ± 0.008 in.) is recorded. Notation is made as to whether the base of a raised fiber surface fabric ignites, chars, melts, or fuses.

5. Significance and Use

5.1 Test Method D1230 cannot be recommended for the acceptance testing of commercial shipments since Federal regulations require apparel fabrics to meet the criteria of 16 CFR Part 1610 and correlation of test results with actual performance has not been established. Although Test Method D1230 is not recommended for acceptance testing, it is useful because it provides a method to test general non-regulated textile fabrics.

5.1.1 In case of a dispute arising from differences in reported test results when using Test Method D1230 for testing of commercial shipments, the purchaser and the supplier shall conduct comparative tests to determine if there is a statistical bias between their laboratories. Competent statistical assistance is recommended for the investigation of bias. At a minimum, the two parties shall take a group of test specimens which are as homogeneous as possible and which are from a lot of material of the type in question. The test specimens shall be randomly assigned in equal numbers to each laboratory for testing. The average results from the two laboratories shall be compared using a nonparametric test for unpaired data and an acceptable probability level chosen by the two parties before testing is begun. If a bias is found, either its cause must be found and corrected or the purchaser and the supplier must agree to interpret future test results in light of the known bias.

5.2 All fabrics made of natural or regenerated cellulose, as well as many made from other natural or man-made fibers, are combustible. Some combustible fabrics when used for clothing are potentially dangerous to the wearer because of such factors as ease of ignition, burn time, amount of heat released, and design of the garment. This test measures two such factors: ease of ignition and burn time.

5.3 In order to place fabrics in one of the three flammability classes, arbitrary limits have been selected for time of application of the flame and for the burn time. These limits are based on extensive testing experience and are believed to be a useful guide in judging the relative flammability of apparel textiles. It must be understood, however, that no guarantee can be given and none is implied that garments made from a fabric or product falling into any one of the flammability classes will not be hazardous under some conditions.

5.3.1 Because of the sensitivity of fabrics to ambient atmospheric conditions, technique of specimen preparation, and inherent variability in the cloth itself, test results are not always closely reproducible either in the same laboratory or among several laboratories.

5.4 Finishes and fabric surface changes can exert a large effect on flammability. Therefore, fabrics are tested before as well as after one cycle of dry cleaning followed by laundering.

6. Apparatus and Materials

6.1 *Flammability Tester*, with a separate timer capable of providing flame impingement on the specimen for 1 ± 0.1 s as shown in **Fig. 1** or an equivalent electrically operated tester

⁴ Available from the U.S. Consumer Product Safety Commission, www.cpsc.gov.

⁵ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.

⁶ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, Case postale 56, CH-1211, Geneva 20, Switzerland, <http://www.iso.ch>.