



Designation: D 4723 – 99

# Standard Index of and Descriptions of Textile Heat and Flammability Test Methods and Performance Specifications<sup>1</sup>

This standard is issued under the fixed designation D 4723; 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 index provides reference tables of test methods and performance specifications used in the United States of America and Canada for measuring and describing the properties of textiles and textile products or assemblies in response to heat and flame under controlled laboratory conditions. Military specifications are not included in the listing. Related but separately published sampling plans are not included. Important criteria associated with each item listed is provided in tabular form.

1.2 The index in Tables 1-76 and identifies three categories:

1.2.1 *Category A*—Test methods and specifications limited to the textile product(s) for which the test method or specification, or both, were developed originally.

1.2.2 *Category B*—Test methods and specifications in which the textile product under evaluation is different from that identified with the original test method or specification, or both. The test method or specification, or both, may or may not have been modified from the corresponding material in the originating document.

1.2.3 *Category C*—Research test methods, specifications, and related documents designed to measure or describe the response of textiles to heat and flame under controlled laboratory conditions but not associated with either mandatory or voluntary conformance in connection with any specific textile end use.

1.2.3.1 Although some research test methods are not included, the listing is reasonably complete for textile items of commerce.

1.3 All published ASTM textile methods are included as well as methods useful for, but not necessarily intended exclusively for, textiles.

1.4 Some documents are included solely because they may be useful for reference or research purposes.

1.5 ASTM assumes no responsibility for the suitability of the listed test methods and performance specifications to describe or appraise the fire hazard of materials, products, or

assemblies under actual fire conditions. Inclusion in this listing does not constitute endorsement by ASTM.

## 2. Referenced Documents

2.1 *ASTM Standards:*

D 123 Terminology Relating to Textiles<sup>2</sup>

D 4391 Terminology Relating to the Burning Behavior of Textiles<sup>3</sup>

## 3. Terminology

3.1 Definitions—For definitions of terms relating to burning behavior, refer to Terminology D 4391. For definitions of other textile terms, refer to Terminology D 123.

## 4. Significance and Use

4.1 The information indexed provides the user with the identification of test methods, performance specifications, and related documents pertaining to the flammability or response to heat of textiles. Enough information on each document is abstracted to allow a judgment as to the potential usefulness of the original method or specification.

## 5. Index of Documents

5.1 *USA Documents (Table 1):*

5.1.1 *ASTM Standards*<sup>4</sup>:

	ID No. <sup>4</sup>
D 1230 Test Method for Flammability of Apparel Textiles	1
D 1518 Test Method for Thermal Transmittance of Textile Materials	2
D 2859 Test Method for Flammability of Finished Textile Floor Covering Materials	3
D 2863 Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)	4
D 3411 Test Methods for Flammability of Textile Materials	5
D 3659 Test Method for Flammability of Apparel Fabrics by Semi-Restraint Method	6
D 4108 Test Method for Thermal Protective Performance of Materials for Clothing by Open-Flame Method	7

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 07.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 07.02.

<sup>4</sup> These identification numbers refer to the boldface identification numbers assigned each document.

<sup>1</sup> This index and description is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.52 on Flammability.

Current edition approved May 10, 1999. Published July 1999. Originally published as D 4723 – 87. Last previous edition D 4723 – 90(1993)<sup>ε1</sup>.

	ID No. <sup>4</sup>		ID No. <sup>4</sup>
D 4151 Test Method for Flammability of Blankets	8	X.2 NFPA 701 Standard Methods of Fire Tests for Flame-Resistant Textiles and Films (as applied to Tents, Tarpaulin, and Other Protective Coverings)	38
D 4372 Specification for Flame-Resistant Materials Used in Camping Tentage	9	X.2 NFPA 702 Standard for Classification of the Flammability of Wearing Apparel (as applied to Tents, Tarpaulin and other Protective Coverings)	39
D 4391 Terminology Relating to the Burning Behavior of Textiles	10	UFAC 83 UFAC Test Methods-83 Six individual tests: Fabric Classification Test Method; Interior Fabrics Test Method; Barrier Test Method; Filling/Padding Component Test Method; Welt Core Test Method; Decking Materials Test Method (UFAC)	40
E 286 Test Method for Surface Flammability of Building Materials Using an 8-ft (2.44-m) Tunnel Furnace	11	BIFMA F-1-78 First Generation Voluntary Upholstery Furniture Flammability Standard for Business and Institutional Markets: A. Small Flame Ignition; B. Cigarette Ignition	41
E 662 Test Method for Specific Optical Density of Smoke Generated by Solid Materials	12		
E 906 Test Method for Heat and Visible Smoke Release Rates for Materials and Products	13		
F 501 Test Method for Aerospace Materials Response to Flame, With Vertical Test Specimen (For Aerospace Vehicles Standard Conditions)	14		
<b>5.1.2 City and State Regulations:</b>		<b>5.1.7 National Bureau of Standards (NBS):</b>	
BFD IX-1 Classification Fire Test	15	Proposed Test Method for Heat Release Measurement by Oxygen Consumption	42
Fire Dept. Advisory Safety Provisions: Office Furniture and Furnishings A) [FTMS 191 Method 5903 (modified)]; B) ASTM E84 (Tunnel Test) or C) ASTM E162-67 Radiant Panel Test Specification Governing the Flammability of Upholstery Material and Plastic Furniture 1) FTMS 191 Method 5903 (Modified) and 2) ASTM E84 and E162	17	Test Method for the Assessment of the Acute Inhalation Toxicity of Combustion Products	43
Tech. Bull. 116 Requirements, Test Procedures and Apparatus for Testing the Flame Retardance of Upholstered Furniture	18	<b>5.1.8 National Fire Protection Association (NFPA):</b>	
Tech. Bull. 117 Requirements, Test Procedures and Apparatus for Testing the Flame Retardancy of Resilient Filling Materials Used in Upholstered Furniture	19	NFPA 253 Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using Radiant Heat Energy Source	44
Fire Dept. Advisory Safety Provisions: Office Furniture and Furnishings	20	NFPA 260A Standard Method of Test and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture	45
Specification Governing the Flammability of Upholstery Materials and Plastic Furniture	21	NFPA 260B Standard Method of Test for Determining Resistance to Ignition by Smoldering Cigarettes	46
Title 19 Flame-Retardant Chemicals and Fabrics	22	NFPA 701 Standard Methods of Fire Tests for Flame-Resistant Textiles and Films	47
Tech. Bull. 133 Flammability Test Procedure for Seating Furniture for Use in High Risk and Public Occupancies	23	NFPA 702 Flammability of Wearing Apparel	48
		NFPA 1971 Protective Clothing for Structural Fire Fighting	49
<b>5.1.3 Consumer Product Safety Commission (CPSC):</b>		<b>5.1.9 Underwriter's Laboratory (UL):</b>	
16 CFR 1610 Standard for the Flammability of Clothing Textiles (General Wearing Apparel)	24	UL 964 Safety Standard for Electrically Heated Bedding	50
16 CFR 1611 Standard for the Flammability of Vinyl Plastic Films (General Wearing Apparel)	25	<b>5.2 Canadian Documents (Table 2):</b>	
16 CFR 1615 Standard for the Flammability of Children's Sleepwear: Sizes 0 Through 6X (FF 3-71)	26	<b>5.2.1 Canadian General Standards Board (CGSB):</b>	
16 CFR 1616 Standard for the Flammability of Children's Sleepwear: Sizes 7 Through 14 (FF 5-74)	27	CAN/CGSB-4.2 NO. 27-M82 Textile Test Methods Flame Resistance—Selection of Methods	1C
16 CFR 1630 Standard for the Surface Flammability of Carpets and Rugs (FF 1-70)	28	CAN/CGSB-4.2 NO. 27.1-M87 Textile Test Methods Flame Resistance—Vertical Burning Test	2C
16 CFR 1631 Standard for the Surface Flammability of Small Carpets and Rugs (FF 2-70)	29	CAN/CGSB-4.2 NO. 27.2-M87 Textile Test Methods Flame Resistance—Surface Burning Test	3C
16 CFR 1632 Standard for the Flammability of Mattresses (and Mattress Pads) (FF 4-72)	30	CAN/CGSB-4.2 NO. 27.3-M86 ISO 6941-1984 Textile Test Methods—Burning Behaviour—Measurement of Flame Spread Properties of Vertically Oriented Specimens	4C
16 CFR 1633 DRAFT Proposed Standard for the Flammability (Cigarette Ignition Resistance) of Upholstered Furniture (PFF 6-81)	31	CAN/CGSB-4.2 NO. 27.4-M86 ISO 6940-1984 Textile Test Methods—Burning Behaviour—Determination of Ease of Ignition of Vertically Oriented Specimens	5C
<b>5.1.4 Department of Transportation (DOT, FAA, and MVSS):</b>		CAN/CGSB-4.2 NO. 27.5-M87 Textile Test Methods—Flame Resistance—45° Angle Test—One Second Flame Impingement	6C
FAA 25.853 (a) and (b) Part 25-Airworthiness Standards: U.S. Transport Category Airplanes	32	CAN/CGSB-4.2 NO. 27.6-M84 Textile Test Methods—Flame Resistance—Methenamine Tablet Test for Textile Floor Coverings	7C
FAA 25.853 (b-2) and (b-3) Part 25-Airworthiness Standards: U.S. Transport Category Airplanes	33	CAN/CGSB-4.2 NO. 27.7-M82 Textile Test Methods Combustion Resistance of Mattresses—Cigarette Test	8C
FAA 25.853 (a-1) Part 25-Airworthiness Standards: U.S. Transport Category Airplanes	34	CAN/CGSB-4.162-M80 Hospital Textiles—Flammability Performance Requirements	9C-13C
MVSS302 Flammability of Interior Materials—Passenger Cars, Multipurpose Passenger Vehicles, Trucks and Buses	35	CAN/CGSB-4.175-M87 ISO 4880-1984 Burning behaviour of textiles and textile products—Vocabulary	14C
<b>5.1.5 Federal Test Method Standards:</b>		<b>5.2.2 Underwriter's Laboratory of Canada (ULC):</b>	
FTMS 191A Test Method 5903 Flame Resistance of Cloth; Vertical	36	CAN4-S 102-M83 Textile Method for Surface Burning Characteristics of Building Materials and Assemblies	15C
<b>5.1.6 Miscellaneous Trade and Industrial Associations (UFAC, BIFMA, and IFAI):</b>		CAN4-S 102.2-M83 Test Method for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies	16C
X.1 CPAI-84 Specification for Flame-Resistant Camping Tentage Materials	37		



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CAN4-S 109-M80 Standards for Flame Tests of Flame Resistance Fabrics and Films	17C	BNQ 7002-580 1982 Textiles—Flame Resistance—Selection of Methods	23C
CAN4-S 117.1-M80 Test Method for Flame Resistance— Methenamine Tablet Test for Textile Floor Coverings	18C	BNQ 7002-590 1982 Textile Burning Behav- iour—Flame Resistance Classification	24C
		BNQ 7002-595 1982 Textiles Burning Behav- iour—Determination of Oxygen Index	25C
<b>5.2.3 Bureau de Normalisation du Québec (BNQ):</b>			
BNQ 7002-500 1982 Textiles—Flame Resistance—Vertical Burning Test	19C	<b>6. Keywords</b>  6.1 angle test; burning behavior; burning rate; combustion; fire; flame resistant; flammability; heat release; horizontal test; ignition; oxygen index; radiant panel; semirestraint; smoke; thermal protective; toxicity; vertical test	
BNQ 7002-510 1982 Textiles—Flame Resistance 45° Angle Test	20C		
BNQ 7002-520 1982 Textiles—Flame Resistance—Rate of Burning	21C		
BNQ 7002-530 1982 Textiles—Flame Resistance—Ease of Ig- nition	22C		

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TABLE 1 USA Flammability Test Methods and Performance Specifications

1 IDENTIFICATION NUMBER	1
2 CATEGORY	A
3 TEST METHOD OR SPECIFICATION DESIGNATION	D 1230 (Compare to 16 CFR 1610)
4 TITLE	Test Method for Flammability of Clothing Textiles
5 SPONSORING ORGANIZATION	ASTM
6 TEST METHOD	yes
7 PERFORMANCE SPECIFICATIONS	yes
8 CONFORMANCE TO SPECIFICATIONS	voluntary
9 DATE OF LATEST APPROVAL	1983
10 GOVERNMENT LEVEL MANDATING	none
11 DESCRIPTION OF TEXTILES COVERED	textile clothing and textiles intended for use in clothing
12 SOURCE OF PUBLICATION	<i>Annual Book of ASTM Standards</i>
13 PROPERTIES MEASURED	time of flame spread and notation of damage to the base of raised fiber surface fabrics
14 SIZE OF TEST SPECIMEN	2 by 6 in.
15 ANGLE OF TEST SPECIMEN	45°
16 IGNITION SOURCE	16-mm butane gas flame
HEAT SOURCE	none
17 IGNITION TIME	1 s
18 PERFORMANCE SPECIFICATIONS CRITERIA:	<i>Plain Surface Textiles:</i>
MINIMUM CONDITIONS TO PASS	<i>Class 1</i> —"Normal flammability"* is (a) average burn time of 3.5 s or more, (b) ignited but extinguished, (c) did not ignite. <i>Class 2</i> —Not applicable. <i>Class 3</i> —"Rapid and intense burning"* is average burn time of less than 3.5 s for 10 specimens. <i>Raised Fiber Surface Textiles:</i> <i>Class 1</i> —"Normal flammability"* is (a) average burn time of 0-7.0 s with less than 2 specimens of 10 burning the base fabric, (b) average burn time of more than 7.0 s for 5 to 10 specimens, (c) no burning of the base fabric, disregarding the average burn time for 5 specimens. <i>Class 2</i> —"Intermediate flammability"* is average burn time of 4.0-7.0 s for 5 or 10 specimens with 2 or more base burns. <i>Class 3</i> —"Rapid and intense burning"* is average burn time of less than 4.0 s and when more than 2 of the 10 specimens have base burns.

\* Descriptive terms for these classes as used in 16 CFR 1610 (ID #24).

1 IDENTIFICATION NUMBER	2
2 CATEGORY	C
3 TEST METHOD OR SPECIFICATION DESIGNATION	D 1518
4 TITLE	Test Method for Thermal Transmittance of Textile Materials
5 SPONSORING ORGANIZATION	ASTM
6 TEST METHOD	yes
7 PERFORMANCE SPECIFICATIONS	no
8 CONFORMANCE TO SPECIFICATIONS	n/a
9 DATE OF LATEST APPROVAL	1985
10 GOVERNMENT LEVEL MANDATING	none
11 DESCRIPTION OF TEXTILES COVERED	single or layered fabrics within a specified range of thermal transmittance
12 SOURCE OF PUBLICATION	<i>Annual Book of ASTM Standards</i>
13 PROPERTIES MEASURED	overall thermal transmission coefficients including the time rate of heat transfer from a warm dry temperature to a cool atmosphere to accommodate the equipment, approx 20¼ in. by 20¼ in.
14 SIZE OF TEST SPECIMEN	horizontal
15 ANGLE OF TEST SPECIMEN	none
16 IGNITION SOURCE	guarded hot plate
HEAT SOURCE	none
17 IGNITION TIME	none
18 PERFORMANCE SPECIFICATION CRITERIA:	none
MINIMUM CONDITIONS TO PASS	