Designation: D7017 – 14

Standard Performance Specification for Rainwear and All-Purpose, Water-Repellent Coat Fabrics[1]

This standard is issued under the fixed designation D7017; 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 performance specification covers rainwear and all-purpose water-repellent coat outer fabrics composed of any textile fiber or mixture of textile fibers.

1.2 This performance specification is not applicable to fabrics used for linings and interlinings.

1.3 These requirements apply to the length and width directions for those properties where fabric direction is pertinent.

1.4 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D123 Terminology Relating to Textiles

D434 Test Method for Resistance to Slippage of Yarns in Woven Fabrics Using a Standard Seam (Withdrawn 2003)[3]

D1424 Test Method for Tearing Strength of Fabrics by Falling-Pendulum (Elmendorf-Type) Apparatus

D2261 Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant-Rate-of-Extension Tensile Testing Machine)

D2724 Test Methods for Bonded, Fused, and Laminated Apparel Fabrics

D3136 Terminology Relating to Care Labeling for Apparel, Textile, Home Furnishing, and Leather Products

D3786 Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method

D3787 Test Method for Bursting Strength of Textiles—Constant-Rate-of-Traverse (CRT) Ball Burst Test

D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

D7022 Terminology Relating to Apparel

2.2 *AATCC Test Methods:*[4]

8 Colorfastness to Crocking: Crockmeter Method

15 Colorfastness to Perspiration

16 Colorfastness to Light

22 Water Repellency: Spray Test

23 Colorfastness to Burnt Gas Fumes

35 Water Resistance: Rain Test

61 Colorfastness to Laundering: Accelerated

107 Colorfastness to Water

116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method

119 Color Change Due to Flat Abrasion (Frosting): Screen Wire Method

124 Smoothness Appearance of Fabrics after Repeated Home Laundering

132 Colorfastness to Dry Cleaning

135 Dimensional Changes of Fabrics after Home Laundering

158 Dimensional Changes on Drycleaning in Perchloroethylene: Machine Method

188 Colorfastness to Sodium Hypochlorite Bleach in Home Laundering

2.3 *Federal Standard:*[5]

16 CFR 1610 Standard for the Flammability of Clothing Textiles

NOTE 1—Reference to test methods in this standard give only the permanent part of the designation of ASTM, AATCC or other test methods. The current edition of each test method cited shall prevail.

3. Terminology

3.1 For all terminology related to Apparel, see Terminology D7022.

3.2 The following terms are relevant to this standard: all-purpose, outerwear, rainwear, water repellency, water resistance.

[1] This specification is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.61 on Apparel.

Current edition approved Feb. 1, 2014. Published March 2014. Originally approved in 2005. Last previous edition approved in 2012 as D7017-12. DOI: 10.1520/D7017-14.

[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] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

[5] Available from Superintendent of Documents, Government Printing Office, Washington, DC.

3.3 For definitions of all other textile terms see Terminology D123.

4. Significance and Use

4.1 Fabrics intended for rainwear and all-purpose, water-repellent coat end use should meet all of the requirements listed in Table 1 of this specification.

4.2 It should be recognized that fabric can be produced utilizing an almost infinite number of combination of construction variables (for example, type of fibers, percentage of fibers, yarn twist, yarn number, warp and pick count, chemical and mechanical finishes). Additionally, fashion or aesthetics dictate that the ultimate consumer may find acceptable articles made from fabrics that do not conform to all of the requirements in Table 1.

4.2.1 Hence, no single performance specification can possibly apply to all the various fabrics that could be utilized for this end-use.

4.3 The uses and significance of particular properties and test methods are discussed in the appropriate sections of the specified test methods.

5. Test Methods (See Note 1)

5.1 *Breaking Force*—Determine the dry breaking force, in the standard atmosphere for testing textiles, as directed in Test Method D5034, using a constant rate of extension (CRE) tensile testing machine.

NOTE 2—If preferred, the use of a constant-rate-of-traverse (CRT) tensile testing machine is permitted. There may be no overall correlation between the results obtained with the CRT machine and with the CRE

TABLE 1 Specification Requirements

NOTE 1—Grade in colorfastness and DP requirements is based on a numerical scale of 5 for negligible or no color change, color transfer, or fabric wrinkle to 1 for severe color change, color transfer, or fabric wrinkle.

Characteristic	Minimum Requirement	Section
Breaking strength (CRE), wovens	178 N (40 lbf)	5.1
Resistance to Yarn slippage – wovens		5.2
6 mm (¼-in.) separation	111 N (25 lbf)	
Tearing Strength – wovens	13 N (3 lbf)	5.3
Bursting Strength – knits	222 N (50lbf)	5.4
Dimensional change:		
Pressing and finishing	2 % max	5.5.1
After laundering	3 % max	5.5.2
After dry cleaning	2 % max	5.5.3
Colorfastness:		
Laundering:[A]		5.6.1
Shade change	Grade 4	
Staining	Grade 3	
Dry cleaning (shade change)	Grade 4	5.6.2
Burnt gas fumes—2 cycles:		
Shade change, original fabric	Grade 4	5.6.3
Shade change after 1 laundering or 1 dry cleaning	Grade 4	
Crocking:[A]		5.6.4
Dry	Grade 4	
Wet	Grade 3	
Chlorine Bleach		5.6.5
Shade Change	Grade 4	
Non-chlorine Bleach		5.6.6
Shade Change	Grade 4	
Water:[A]		5.6.7
Shade change	Grade 4	
Staining	Grade 4	
Perspiration:[A]		5.6.8
Shade change	Grade 4	
Staining	Grade 3	
Light (20 AATCC Fading Units)	Grade 4	5.6.9
Frosting	Grade 4	5.6.10
Water repellency:		
Smooth-textured fabrics:		
Original	90	5.7
After 5 launderings or 3 dry cleanings	70	
Rough-textured:		
Original	80	5.7
After 5 launderings or 3 dry cleanings	70	
Water resistance (categories based on time for maximum weight increase at following head pressures):		
Shower 600 mm (2 ft) for 30 seconds	1 gram, max	5.8
Rain 600 mm (2 ft) for 2 minutes	1 gram, max	5.8
Storm 915 mm (3 ft) for 5 minutes	1 gram, max	5.8
Fabric appearance	SA 3.5	5.9
Flammability	Class 1	5.10

[A] See Note 6.

machine. Consequently, these two breaking load testers cannot be used interchangeably. In case of controversy, the CRE method (Test Method D5034) shall prevail.

5.2 *Resistance to Yarn Slippage*—Determine the resistance to yarn slippage as directed in Test Method D434.

5.3 *Tear Strength*—Determine the tear strength as directed in Test Method D1424.

NOTE 3—If preferred, use of Test Method D2261 is permitted with existing requirements as given in this specification. There may be no overall correlation between the results obtained with the tongue tear machine (Test Method D2261) and with the Elmendorf machine (Test Method D1424). Consequently, these two tongue tear testers cannot be used interchangeably. In case of controversy, Test Method D1424 shall prevail.

5.4 *Bursting Strength*—Determine the bursting strength of knit fabrics as directed in Test Method D3786.

NOTE 4—There is no overall correlation between the results obtained with the diaphragm bursting tester (Test Method D3786) and the CRT machine equipped with a bursting attachment (Test Method D3787). Consequently, these two bursting testers cannot be used interchangeably. In case of controversy, Test Method D3786 shall prevail.

5.5 *Dimensional Change:*

5.5.1 *Pressing and Finishing During Garment Manufacturing*—Determine the dimensional change during pressing and finishing as directed in AATCC Test Method 135.

5.5.1.1 If no agreement has been made between purchaser and supplier, press and finish specimen(s) using a flat-bed press as described in Test Method D2724.

5.5.2 *Laundering*—Determine the dimensional change after laundering as directed in the applicable procedure in AATCC Test Method 135.

5.5.3 *Dry Cleaning*—Determine the dimensional change after dry cleaning in accordance with AATCC Test Method 158

NOTE 5—Launderable fabrics are expected normally to be able to be drycleaned except where all or part of the fabric will not withstand drycleaning. For example, the fabric could contain a functional finish soluble in the solvent, or the fiber could be degraded by the solvent, which would be the case with poly(vinyl chloride) fiber. If a fabric would be harmed by ALL methods of care except for drycleaning, it should be considered Dry Clean only.

5.6 *Colorfastness:*

5.6.1 *Laundering*—Determine the colorfastness to laundering as directed in the applicable procedure of AATCC Test Method 61.

NOTE 6—It has been reported that the results for staining, obtained by standard AATCC Test Methods, on fabrics dyed to dark shades that contain a combination of polyester and spandex, or their blends, may not show the full staining propensity of such fabrics in consumer use. It is, therefore, recommended that the staining results obtained by these tests not be used for acceptance testing of such fabrics.

5.6.2 *Dry Cleaning*—Determine the colorfastness to dry cleaning as directed in AATCC Test Method 132.

5.6.3 *Burnt Gas Fumes*—Determine the colorfastness to burnt gas fumes on the original fabric and after one laundering or one dry cleaning as directed in AATCC Test Method 23. Washing conditions shall be the same as those used in 5.5.2.1. Dry cleaning conditions shall be the same as those used in 5.5.3 (see Note 6).

5.6.4 *Crocking*—Determine the colorfastness to dry and wet crocking as directed in AATCC Test Method 8 for solid shades and AATCC Test Method 116 for prints (see Note 6).

5.6.5 *Sodium Hypochlorite Bleach*—Determine the colorfastness sodium hypochlorite bleach as directed in AATCC Test Method 188.

5.6.6 *Non-Chlorine Bleach*—Determine the colorfastness to non-chlorine bleach as directed in AATCC Test Method 171.

5.6.7 *Water*—Determine colorfastness to water as directed in AATCC Test Method 107 (see Note 6).

5.6.8 *Perspiration*—Determine the colorfastness to perspiration as directed in AATCC Test Method 15 (see Note 6).

5.6.9 *Light*—Determine the colorfastness to light as directed in AATCC Test Method 16.

NOTE 7—There are distinct differences in spectral distribution between the various types of machines listed in AATCC Test Method 16, with no overall correlations between them. Consequently, these machines cannot be used interchangeably. In case of controversy, results obtained with the water-cooled xenon-arc machine listed in Option 3 shall prevail.

5.6.10 *Color Change Due to Flat Abrasion — (Frosting)*—Determine the color change due to flat abrasion (frosting) as directed in AATCC Test Method 119.

5.7 *Water Repellency (Spray Test)*—Determine the resistance to water repellence (spray test) on the original fabric and after five launderings or three dry cleanings as directed in AATCC Test Method 22.

5.7.1 Determine the resistance to wetting of laundered or dry-cleaned fabrics after pressing.

5.8 *Water Resistance (Rain Test)*—Determine the water resistance (rain test) on the original fabric and after three launderings or three dry cleanings as directed in AATCC Test Method 35.

5.8.1 Fabrics shall be classified by conformance to the requirements given for the categories in Table 1.

5.9 *Fabric Appearance*—Determine the fabric smoothness appearance (SA) after laundering or dry cleaning as directed in AATCC Test Method 124.

5.9.1 For fabrics not intended for use in durable-press garments, determine the smoothness appearance after pressing as specified in AATCC Test Method 135.

5.9.1.1 The smoothness appearance rating of such fabrics shall have decreased no more than ½ SA rating from that of the fabric before it is laundered or dry-cleaned.

5.10 *Flammability*—The textile fabrics shall meet or exceed the Flammable Fabrics Act mandatory standards as specified in 16 CFR 1610.

6. Keywords

6.1 fabric; performance; rainwear; specification; water repellant; water resistant.