



Designation: D7017 – 20

Standard Performance Specification for Water-Resistant Rainwear and All-Purpose, Water-Repellent Coat Fabrics¹

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

1.5 *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
- D434 Test Method for Resistance to Slippage of Yarns in Woven Fabrics Using a Standard Seam (Withdrawn 2003)³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

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

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

- D2261 Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant-Rate-of-Extension Tensile Testing Machine)
- 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
 - TM8 Colorfastness to Crocking: Crockmeter Method
 - TM15 Colorfastness to Perspiration
 - TM16.3 Colorfastness to Light: Xenon-Arc
 - TM22 Water Repellency: Spray Test
 - TM23 Colorfastness to Burnt Gas Fumes
 - TM35 Water Resistance: Rain Test
 - TM61 Colorfastness to Laundering: Accelerated
 - TM107 Colorfastness to Water
 - TM116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method
 - TM119 Color Change Due to Flat Abrasion (Frosting): Screen Wire Method
 - TM124 Smoothness Appearance of Fabrics after Repeated Home Laundering
 - TM132 Colorfastness to Dry Cleaning
 - TM135 Dimensional Changes of Fabrics after Home Laundering
 - TM158 Dimensional Changes on Drycleaning in Perchloroethylene: Machine Method
 - TM172 Colorfastness to Powdered Non-chlorine Bleach in Home Laundering
 - TM188 Colorfastness to Sodium Hypochlorite Bleach in Home Laundering
 - EP1 AATCC Gray Scale for Color Change
 - EP2 AATCC Gray Scale for Staining
 - EP8 AATCC 9-Step Chromatic Transference Scale

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

M11 A Glossary of AATCC Standard Terminology
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**.

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

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

3.2 For definitions of all other textile terms see Terminology **D123**.

3.3 For terms relating to chemical or colorfastness testing, refer to specific AATCC test methods, or the Glossary of AATCC Standard Terminology, or both.

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.

TABLE 1 Specification Requirements

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

Characteristic	Minimum Requirement	Section
<i>Breaking strength</i> (CRE), wovens	178 N (40 lbf)	5.1
<i>Resistance to Yarn slippage</i> – wovens 6 mm (¼-in.) separation	111 N (25 lbf)	5.2
<i>Tearing Strength</i> – wovens	13 N (3 lbf)	5.3
<i>Bursting Strength</i> – knits	222 N (50lbf)	5.4
<i>Dimensional change:</i>		
Pressing and finishing	2 % max	5.5.1
After laundering	3 % max	5.5.2
After dry cleaning	2 % max	5.5.3
<i>Colorfastness:</i>		
<i>Laundering:</i> ^A		5.6.1
Shade change	Grade 4	
Staining	Grade 3	
<i>Dry cleaning</i> (shade change)	Grade 4	5.6.2
<i>Burnt gas fumes</i> —2 cycles:		
Shade change, original fabric	Grade 4	5.6.3
Shade change after 1 laundering or 1 dry cleaning	Grade 4	
<i>Colorfastness:</i> ^A		5.6.4
Dry	Grade 4	
Wet	Grade 3	
<i>Chlorine Bleach</i>		5.6.5
Shade Change	Grade 4	
<i>Non-chlorine Bleach</i>		5.6.6
Shade Change	Grade 4	
<i>Water:</i> ^A		5.6.7
Shade change	Grade 4	
Staining	Grade 4	
<i>Perspiration:</i> ^A		5.6.8
Shade change	Grade 4	
Staining	Grade 3	
<i>Light</i> (20 AATCC Fading Units)	Grade 4	5.6.9
<i>Frosting</i>	Grade 4	5.6.10
<i>Water repellency:</i>		
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	
<i>Water resistance</i> (categories based on time for maximum weight increase at following head pressures):		
Shower 600 mm (2 ft) for 30 s	1 g, max	5.8
Rain 600 mm (2 ft) for 2 min	1 g, max	5.8
Storm 900 mm (3 ft) for 5 min	1 g, max	5.8
<i>Fabric appearance</i>	SA 3.5	5.9
<i>Flammability</i>	Class 1	5.10

^ASee **Note 6**.

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** and **Note 1** in **Table 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. (See **Note 2**).

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 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** (see **Note 3**).

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** (see **Note 4**).

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*—Mark specimen(s) as directed in 6.2 of AATCC TM135. Press and finish specimen(s) as agreed to by the purchaser and supplier or using the procedure in AATCC TM 158. Measure the specimen(s) and calculate the dimensional change as directed in Sections 8 and 9 of 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 AATCC TM 158.

5.5.2 *Laundering*—Determine the dimensional change after laundering as directed in the applicable procedure in AATCC TM135 or as agreed to by the purchaser and supplier.

5.5.3 *Dry Cleaning*—Determine the dimensional change after dry cleaning in accordance with AATCC TM 158 (see **Note 5**).

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 TM61.

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 TM132.

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 TM23. 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 TM8 for solid shades and AATCC TM116 for prints (see **Note 6**).

5.6.5 *Sodium Hypochlorite Bleach*—Determine the colorfastness sodium hypochlorite bleach as directed in AATCC TM188.

5.6.6 *Non-Chlorine Bleach*—Determine the colorfastness to non-chlorine bleach as directed in AATCC TM172.

5.6.7 *Water*—Determine colorfastness to water as directed in AATCC TM107 (see **Note 6**).

5.6.8 *Perspiration*—Determine the colorfastness to perspiration as directed in AATCC TM15 (see **Note 6**).

5.6.9 *Light*—Determine the colorfastness to light as directed in AATCC TM16.3, Option 3.

5.6.10 *Color Change Due to Flat Abrasion — (Frosting)*—Determine the color change due to flat abrasion (frosting) as directed in AATCC TM119.

5.7 *Water Repellency (Spray Test)*—Determine the resistance to water repellence (spray test) on the original fabric and after five laundings or three dry cleanings as directed in AATCC TM22.

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 laundings or three dry cleanings as directed in AATCC TM35.

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